Chapter 3.
State Planning and Incentive Structures

States are achieving substantial energy cost savings, emission reductions, and economic benefits by implementing planning approaches and incentive structures that advance the use of clean energy. This chapter describes four planning and incentive policies, beginning with state programs to "lead by example" by implementing clean energy actions within their internal operations. It also covers state and regional planning efforts to promote clean energy and quantify related air quality benefits. The last policy describes approaches for financing these clean energy activities.

The policies shown in Table 3.1 were selected from among a larger universe of opportunities for supporting clean energy because of their proven effectiveness and their successful implementation by a number of states. The information presented in each policy description is based on the experiences and best practices of states that are implementing the programs, as well as on other sources, including local, regional, and federal agencies and organizations, research foundations and nonprofit organizations, universities, and utilities.

Table 3.1 also lists examples of some of the states that have implemented programs for each policy. States can refer to this table for an overview of the policies described in this chapter and to identify other states that they may want to contact for additional information about their clean energy programs. The *For More Information* column shows the *Guide to Action* section where each in-depth policy description is located.

In addition to these four policies, which are tied to state planning and incentive structures, states are adopting a number of other policies and programs to promote increased use of energy efficiency and clean energy supply that may interact with planning and incentives. These policies are addressed in other sections of the *Guide to Action*, as listed in the box, *Clean Energy Policies*, and described briefly in Chapter 1.

Clean Energy Policies

Type of Policy	For More Information
State Planning and Incentive Structures	
Lead by Example	**Section 3.1**
State and Regional Energy Planning	**Section 3.2**
Determining the Air Quality Benefits of Clean Energy	**Section 3.3**
Funding and Incentives	**Section 3.4**
Energy Efficiency Actions	
Energy Efficiency Portfolio Standards	Section 4.1
Public Benefits Funds for Energy Efficiency	Section 4.2
Building Codes for Energy Efficiency	Section 4.3
State Appliance Efficiency Standards	Section 4.4
Energy Supply Actions	
Renewable Portfolio Standards	Section 5.1
PBFs for State Clean Energy Supply Programs	Section 5.2
Output-Based Environmental Regulations to Support Clean Energy Supply	Section 5.3
Interconnection Standards	Section 5.4
Fostering Green Power Markets	Section 5.5
Utility Planning and Incentive Structures	
Portfolio Management Strategies	Section 6.1
Utility Incentives for Demand-Side Resources	Section 6.2
Emerging Approaches: Removing Unintended Utility Rate Barriers to Distributed Generation	Section 6.3

Table 3.1: State Planning and Incentive Structures

Policy	Description	State Examples	For More Information
Lead by Example	States lead by example by establishing programs that achieve substantial energy cost savings within their own operations, buildings, and fleets and demonstrate the feasibility and benefits of clean energy to the larger market.	CA, CO, IA, NH, NJ, NY, OR, TX	Section 3.1
State and Regional Energy Planning	Energy planning at a state or regional level can be an effective means for ensuring that clean energy is considered and used as an energy resource to help states address their multiple energy and nonenergy challenges.	CA, CT, NM, NY, OR, New England Governors' Conference (NEGC), Northwest Power and Conservation Council, Western Governors' Association (WGA), Western Interstate Energy Board	Section 3.2
Determining the Air Quality Benefits of Clean Energy	States estimate the emission reductions from their clean energy programs and incorporate those reductions into clean energy programs and policies.	LA (local), MD (local), TX, WI, Western Regional Air Partnership (WRAP)	Section 3.3
Funding and Incentives	States implement a range of targeted funding and incentives strategies that encourage governments, businesses, and consumers to save energy through cost-effective clean energy investments. Between 20 and 30 states have revolving loan funds for energy efficiency, tax incentives for renewable energy, grants for renewable energy, or rebates for renewable energy.	CA, CO, IA, MT, NY, OR, TX, WA	Section 3.4

3.1 Lead by Example

Policy Description and Objective

Summary

State and local governments are implementing a range of programs and policies that advance the use of clean energy within their own facilities, fleets, and operations. These "lead by example" initiatives help state and local governments achieve substantial energy cost savings while promoting the adoption of clean energy technologies by the public and private sectors.

States are leveraging their purchasing power, their control of significant energy-using resources, and the high visibility of their public facilities to demonstrate clean energy technologies and approaches that lower their energy costs and reduce emissions. They also work closely with local governments, schools, colleges and universities, parks and recreation facilities, and other public sector organizations to promote clean energy within their operations. Lead by example programs take many forms, including:

- Incorporating clean energy principles into statewide energy policies.
- Adopting energy efficiency savings goals for existing public buildings.
- Establishing energy efficiency performance standards for new and renovated public buildings.
- Procuring energy-efficient equipment for public facilities, including implementing "green fleets" programs.
- Purchasing and using renewable energy and clean energy generation in public facilities.
- Developing innovative financing mechanisms, including:
  - Establishing energy efficiency loan funds.
  - Creating a master financing program with private sector investors to capture energy savings.
  - Directing public pension fund trustees and managers to establish energy-efficient investment strategies for real estate and securities portfolios and/or allocate investment funds for energy-efficient and renewable energy technology development.
  - Approving legislation enabling state agencies (and other local governments) to enter into energy savings performance contracts that require that the savings cover the cost of financing the improvements out of current and future operating budgets.
- Providing technical assistance and training to state and local facility managers and their staff, including, for example:
  - Developing building design and commissioning guidelines.
  - Assisting with energy audits and implementation of verified savings using Energy Service Companies (ESCOs).

"Lead by example" programs offer states opportunities to achieve substantial energy cost savings within their own operations, demonstrate environmental leadership, and raise public awareness of the benefits of clean energy technologies.

The potential energy and cost savings that can be achieved through energy-efficient improvements in public facilities are substantial. States are responsible for more than 16 billion square feet of building space and spend more than $11 billion annually on building energy costs, which can account for as much as 10% of a typical government's annual operating budget (DOE 2005e).

Objective

The objectives of state lead by example programs vary from state to state. They include:

- Serving as a leading component of comprehensive statewide clean energy programs and initiatives and encouraging action by a broad range of public and private sector organizations.

- Accelerating adoption of clean energy in the marketplace by setting an example and demonstrating cost-effectiveness.
- Educating and informing policymakers and stakeholders and raising public awareness about the multiple environmental, economic, and energy benefits that clean energy offers.
- Achieving cost savings through adoption of energy-efficient technologies and clean generation.

Benefits

Lead by example programs provide direct operational benefits to state and local governments, including:

- Reducing facility operation costs and increasing funding available for nonenergy-related expenditures.
- Encouraging clean energy development in the state and region and demonstrating environmental leadership.
- Achieving substantial cost savings through aggregated purchasing of energy-efficient products and green power.
- Supporting the development of in-state markets for clean energy products, manufacturers, and services (e.g., ESCOs, renewable energy equipment installers, and energy-efficient product retailers).

Many state lead by example programs focus on improving the energy efficiency of equipment and building systems. Additional benefits, however, can be achieved by purchasing or generating clean power for public facilities. A number of options are available to state and local governments, including:

- Purchasing green power for public facility consumption.
- Using combined heat and power (CHP) technologies to reduce energy use through higher efficiency.
- Developing onsite clean energy facilities, such as solar photovoltaic (PV), wind, and CHP.
- Using existing government resources for clean power production (e.g., electricity generation from landfill gas, methane recovery at sewage treatment plants, and biomass resulting from tree and garden trimming).

States with Lead by Example Programs

While the possibilities for state lead by example initiatives are broad, current state lead by example initiatives typically fall into one of the following categories:

- *State Clean Energy Plans.* Several states are incorporating specific clean energy goals and objectives for state facilities in their state energy plans. States that show leadership in this area include Iowa, Connecticut, and California. (See the *State and Local Examples* section on page 3-13.)
- *Energy Savings Targets.* States also set energy savings goals for existing facilities, typically expressed as percentage targets with calendar milestones (e.g., reducing energy use per square foot by 20% by 2010). Several states have enacted legislation to set these targets. For example, in 2003, the Arizona legislature passed HB 2324 that requires state agencies and universities to achieve a 10% reduction in energy use per unit of floor area by 2008 and a 15% reduction by 2011. California,

New York's "Green and Clean" State Buildings and Vehicles

New York's Executive Order 111, adopted in 2001, establishes a comprehensive energy efficiency and renewable energy program through government procurement standards and building design practices. Applicable to all state agencies and departments, the order:

- Sets targets for reducing energy consumption in state buildings.
- Sets goals and targets for purchasing renewable energy sources and clean fuel vehicles.
- Establishes energy performance criteria and guidelines for new and existing buildings.
- Requires purchase of ENERGY STAR products when purchasing new or replacement equipment (New York 2004).

New Hampshire, and New York have also adopted energy savings targets.

- *Energy Efficiency Performance Standards.* Some states establish sustainable design principles that incorporate energy efficiency criteria in performance standards for new and renovated buildings and facilities. States that have established energy efficiency performance standards include Oregon and Massachusetts.
- *Energy-Efficient Purchasing.* States are specifying minimum energy efficiency specifications for a range of products (e.g., appliances, equipment, green fleets of vehicles that use alternative fuels). In some cases, states establish procurement policies that reference the ENERGY STAR label. Where mandatory low-bid requirements are in place, legislative authority might be required to modify procurement regulations. States that have issued executive orders and/or legislation to require procuring energy-efficient products include Arizona, New Hampshire, New York, and California.
- *Clean Energy Generation.* Purchasing and using renewable energy and clean energy generation for state and local facilities is another way states are leading by example. State and local agencies have established clean energy supply targets that are met through onsite generation or by purchasing green power electricity or renewable energy certificates. An increasing number of state and local governments, including New Jersey, New York, and Iowa, are aggregating electricity demand to purchase green power. States are also identifying opportunities to generate clean onsite power, such as CHP systems, and to use clean DG technologies for backup or emergency power.
- *Innovative Financing.* States are developing a wide range of innovative financing mechanisms, including revolving loan funds, tax-exempt master lease-purchase agreements, lease revenue bonds, pension funds, and performance contracting. These financing mechanisms, used to finance programs to implement energy efficiency improvements in existing buildings, renovation projects, and new state facilities, are usually administered by the state energy office or other lead agency, which coordinates the program across multiple state agencies.

  Iowa has been a leader in state financing for public facilities. Legislation passed in the 1980s established the Iowa Energy Bank and the State Facilities Program. In Maryland, the State Agency Loan Program (SALP) provides 0% loans to state agencies for cost-effective energy-efficient improvements in state facilities. This self-sustaining fund is capitalized with national oil overcharge funds. Since its

Iowa's Executive Order 41

Iowa's Executive Order 41, adopted April 22, 2005, directs state agencies to obtain at least 10% of their electricity from renewable energy sources by 2010. To satisfy this requirement, agencies may generate their own renewable energy or participate in their utility's green power programs (Iowa 2005).

Examples of State and Local Green Power Purchasing Contracting

- In 1999, 178 public agencies in New Jersey aggregated power purchases with the goal of negotiating lower energy costs. A portion of the resulting savings was reinvested in clean energy. Now, 12% of the agencies' energy needs are met with green power.
- Montgomery County, Maryland, led a regional partnership to purchase wind energy. Participating entities include six Montgomery County agencies and 12 other local government entities. Green power currently supplies about 5% of the aggregate demand in county facilities.
- The Cape Light Compact in Massachusetts is an organization with members from all 21 towns of Cape Cod and Martha's Vineyard, and Barnstable and Dukes counties. The Compact negotiates lower cost electricity and other benefits for all members. Recently the Compact began to offer customers green power products with up to 100% renewable energy (EPA 2004a, Montgomery County 2004, Cape Light Compact 2005, DOE 2005d).

inception in 1991, SALP has funded more than $9 million to upgrade lighting, controls, boilers, chillers, and other energy equipment. Agencies repay the loan through their fuel and utility budgets, based on the avoided energy costs of the project (MEA 2005).

New Hampshire has a master lease program in place for state facilities that leverages energy savings from current and future operating budgets to cover the financing cost of new equipment. California offers a revenue bond program to provide low-cost financing of alternative energy equipment and for energy and water conservation measures by state and K-12 facilities. While performance contracts are not financing agreements, per se, they can assist with project funding and implementation. In Louisiana, state agencies will be able to issue Request for Proposals (RFPs) that essentially follow the performance contract model developed by the state Energy Fund. Colorado passed enabling legislation authorizing performance contracting in the early 1990s.

- *Technical Support.* Many states lead by example by providing technical assistance, training, and evaluation support to state and local agencies and facility operators. State examples include California's new building design and commissioning guidelines and Oregon's Building Commissioning Program. California's Energy Partnership Program provides a variety of services including conducting energy audits, preparing feasibility studies, and reviewing existing proposals and designs. In Washington, school districts are advised to seek the assistance of the General Administration's Energy Savings Performance Contracting (ESPC) program for energy performance contracts and for project oversight.

Designing an Effective Lead by Example Program

Although specific program designs vary from state to state, a number of common elements exist that have helped states develop effective lead by example programs. These include: involving multiple agencies and levels of government, identifying funding sources, and leveraging federal and state programs.

Participants

- *Executive Branch.* The executive branch plays a key role in lead by example initiatives. Many state governors have issued executive orders that set energy savings targets for existing buildings, define energy and environmental performance standards for new buildings, set fuel economy targets for state-owned or -leased vehicle fleets, create green power purchasing policies, and create efficiency guidelines for purchasing energy-using equipment. Since most lead by example initiatives involve state-owned or -leased property, the executive branch typically has broad powers to change policies and practices involving state facilities, fleets, purchasing operations, and other aspects of state government. An example of this is New York's Executive Order 111, Green and Clean State Buildings and Vehicles, which sets targets for 100% of all new light-duty vehicles to be alternative-fueled vehicles by 2010 and for energy consumption in all buildings to be reduced by 35% (relative to 1990 levels) by 2010.
- *State Legislature.* In many cases, legislative authority is not needed to launch lead by example initiatives. However, legislative authority may be required when modifying procurement regulations (e.g., to release state agencies from mandatory low-bid requirements when purchasing green power or to enable agencies to enter into long-term energy service agreements for performance contracting). For example, Washington's Engrossed House Bill 2247 requires energy audits in state buildings, and if the audits produce opportunities to save energy, the improvements are to be accomplished by using performance

contracting. Performance contracting has been promoted by North Carolina's state legislature as a means of reaching its energy savings goals and updating facilities without using limited capital budget dollars.

- *State Energy Office.* In many states, the energy office develops and administers a range of clean energy programs and provides technical assistance and training to state and local agency staff and facility managers. State energy offices also work with other state agencies, local governments, school districts, and other public organizations to identify clean energy opportunities statewide.
- *State Department of General Services and Department of the Treasury.* One of these agencies typically serves as the custodian of state facilities. They administer state capital construction programs and establish guidelines for construction, operation, and purchasing practices.
- *State Housing and Economic Development Offices.* These agencies may operate a variety of programs, including low- and moderate-income housing and development programs, state mortgage financing programs, and enterprise zone and brownfield redevelopment initiatives.
- *Local Governments.* In many cases, local governments have initiated and adopted their own lead by example programs. For example, in Maryland, Montgomery County has developed a green power purchasing program to leverage the buying power of multiple local jurisdictions. Some states work with local governments to educate local officials about these opportunities and to coordinate, pool, and set common criteria for such initiatives. States can also provide financial assistance, education, training, and technical assistance to local governments. For example, Arizona's Municipal Energy Management Program (MEMP), administered by the Arizona Commerce Department, provides training, tools, technical assistance, and grants to municipal and tribal governments to help implement energy saving projects (Arizona Department of Commerce 2005).
- *School Districts, Colleges, and Universities.* There are many opportunities to improve energy efficiency and purchase or generate clean onsite power at K-12 schools, colleges, and universities. One option is to use efficiency savings in operating budgets to finance new energy projects, thereby freeing up capital budget dollars for other uses. In fact, some colleges and universities have found that investing in energy efficiency projects provides better yields than the market. For example, Duke University has used endowment funds to finance energy efficiency projects.
- *Utility Energy Programs.* Utilities that have energy efficiency and onsite distributed generation programs can support a state's lead by example efforts by providing technical assistance to state facility managers and new facility design teams. In some cases, utilities provide funding and incentives to state agencies for clean energy projects. Utilities that administer PBFs or that have regulated efficiency acquisition mandates are typically best positioned to provide this kind of assistance.
- *ESCOs.* ESCOs can perform energy project assessments and/or conduct full energy efficiency projects on a performance-contracting basis. In such projects, the state does not provide upfront capital; the ESCO develops and finances the project, using efficiency savings to cover the cost of capital.
- *Nonprofit Organizations.* Some states designate and work with third-party nonprofit organizations to develop and administer lead by example programs. For example, Iowa established the State of Iowa Facilities Improvement Corporation (SIFIC), a nonprofit corporation that helps state agencies implement cost-effective energy efficiency improvements. Also of note is Efficiency Vermont, which was established in 1999 by the Vermont legislature and Public Service Board as the nation's first statewide energy efficiency utility. Efficiency Vermont provides technical assistance and financial incentives to help Vermonters identify and pay for cost-effective energy-efficient building design, construction, renovation, equipment, lighting, and appliances.
- *State Treasurers and Public Pension Fund Managers.* The role of pension fund trustees and state treasurers is to provide policy direction for fund managers and are increasingly looking for opportunities to improve the value of their portfolios. Some state

treasurers and public pension fund managers invest in clean energy programs and energy audit investments to identify cost savings. For example, California's state treasurer started the Green Wave program to encourage pension fund investment in energy efficiency and renewable energy retrofits and upgrades on state property. This type of investment not only provides an opportunity for fund managers to "green" their portfolios, but also saves money and increases the value of the assets and overall portfolio.

Funding

States sometimes pay for energy efficiency and renewable energy projects with general funds allocated through the budget and appropriations process. However, because of fiscal constraints, states are developing new funding approaches for their clean energy investments. One popular underlying strategy involves redirecting the operating budget dollars saved from the utility budget when energy conservation improvements are made and using the savings to pay for the financing of the needed equipment. Several states have adopted innovative funding mechanisms to support lead by example programs, including:

- *Revolving Loan Funds.* These entities make loans and re-lend current loan payments to fund new projects. The original capitalization can come from a variety of sources including system benefits charges (SBCs) and oil overcharge refunds. They are typically low interest, long-term loans for energy conservation or renewable energy projects. They may cover all capital expenditures or may be on a cost-shared basis. The Iowa Energy Bank, described in the *State and Local Examples* section, on page 3-13, provides an example of how Iowa has structured its loan program. (For more detailed information on revolving loan funds, see Section 3.4, *Funding and Incentives.* Also see the Texas LoanSTAR program in the *State and Local Examples* section.)
- *ESPC.* The ESPC industry has developed over the past 25 years in response to the need for major new capital investments in energy efficiency, particularly in public and institutional facilities. Energy Performance Contracting is a construction method that allows a facility to complete energy-saving improvements within an existing budget by financing them with money saved through reduced utility expenditures. Facilities make no initial capital investments and instead finance projects through guaranteed annual energy savings. Several states have created enabling legislation and developed model programs, helping to develop an industry capable of bringing significant capital investment to state governments. (See Section 3.4, *Funding and Incentives.*)
- *PBFs.* PBFs are funds typically created by per kWh charges on electricity bills. Many states use PBF resources to help support clean energy programs. PBFs were initially developed during the 1990s to provide resources to help fund public benefits programs that utilities were not expected to pursue in a restructured electricity market. These funds are used to support renewable energy, energy efficiency, and low-income programs. (See Section 4.2, *Public Benefits Funds for Energy Efficiency,* and Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs.*)
- *Aggregated Purchasing Contracts for Green Power.* An increasing number of organizations, including state and local governments, are aggregating electricity demand to purchase green power. By combining the electrical needs of a number of agencies, state and local governments are often able to negotiate lower prices for green power. It is easier to achieve savings from aggregated green power purchases in restructured markets where there are competing energy suppliers.
- *Pension Funds.* Some states use pension funds to invest in clean energy projects. Pension fund managers seek a mix of investments that ensure stable returns for their contributors when they retire. Energy cost savings are captured over a set time period to pay off the capital investment, and generate a solid return to the pension fund.

For example, Washington Real Estate Holdings, a real estate manager for the Washington State Investment Board, which manages the state's pensions, completed a $3.5 million SMART ENERGY and energy efficiency upgrade of Union Square that lowered the building energy costs by 40% and created 30 jobs for a year (Feldman 2005).

- *Use of Life Cycle Cost Accounting for Energy Efficiency Projects.* Cost-effective energy efficiency investments more than pay for themselves in the form of reduced energy bills over the life of the investment. However, government procurement and capital budgeting practices frequently do not take life cycle costs into account. Procurement rules (e.g., applicable to small purchases, such as equipment replacement) often require states to accept the lowest bid, on a first-cost-only basis. Similarly, capital budgeting (e.g., applicable for larger investments such as new buildings or major renovations) often accounts only for the debt service obligations to the government and does not recognize operating budget savings that can more than offset the debt service payments. These practices often result in the rejection of cost-effective energy efficiency investments because the accounting rules do not fully recognize the benefits of these investments.

  To overcome these problems, states have modified procurement rules by (1) specifying minimum efficiency levels for designated types of purchases (such as requiring certain product types to be ENERGY STAR-certified), or (2) instituting a life cycle-cost bid procedure, where vendors provide both equipment investment costs and estimated lifetime energy costs for designated equipment types. For capital projects, a similar approach can be used: either requiring projects to meet specified energy performance targets or including life cycle energy costs in the project accounting analysis.

Interaction with Federal Policies

Several federal programs, described as follows, provide resources for states as they develop lead by example programs.

The ENERGY STAR Program

The U.S. Environmental Protection Agency (EPA) offers its ENERGY STAR program to governments, schools, and businesses as a straightforward way to achieve superior energy management and realize the cost savings and environmental benefits that can result. EPA's guidelines for building energy management promote a strategy that starts with the top leadership, engages the appropriate employees throughout the organization, uses standardized measurement tools, and helps an organization prioritize and gets the most from its efficiency investments. The following aspects of ENERGY STAR offer resources for states as they lead by example.

- *The ENERGY STAR Challenge.* In March 2005, EPA, in partnership with more than 20 leading associations and states, launched the ENERGY STAR Challenge—Build a Better World 10% at a Time. The ENERGY STAR Challenge calls on governments, schools, and businesses across the country to identify the many buildings where financially attractive improvements can reduce energy use by 10% or more and to make the improvements through proven methods such as low-cost building tune-ups, lighting upgrades, and replacement of old equipment. EPA estimates that if each building owner accepts this challenge, by 2015 Americans would save about $10 billion and reduce greenhouse gas emissions by more than 20 million metric tons of carbon equivalent (MMTCE)—equivalent to the emissions from 15 million vehicles.

  As participants in the ENERGY STAR Challenge, states are encouraging energy-efficient improvements in government buildings and facilities, including school districts and county and city governments, and reaching out to businesses in their communities (ENERGY STAR 2005d).
- *Targeted Assistance to States.* ENERGY STAR provides targeted information resources, technical assistance, tools, and communications and outreach support to help state and local governments improve energy efficiency within their own operations. ENERGY STAR tools include guidelines for energy management that are helpful to states in improving their energy and financial performance,

as well as a portfolio manager that provides tools related to benchmarking, measurement and verification (M&V), and investment priorities (ENERGY STAR 2005b).

- *Purchasing and Procurement.* As part of its targeted assistance to states, ENERGY STAR provides a comprehensive guide to purchasing energy-efficient products. These purchasing and procurement resources include sample procurement language and energy efficiency specifications for many products. For products not covered under ENERGY STAR, EPA provides links to the U.S. Department of Energy's (DOE's) recommended energy-efficient products used by federal government procurement officials (ENERGY STAR 2005c).

EPA Combined Heat and Power Partnership

The CHP Partnership is a voluntary program to reduce the environmental impact of power generation by promoting the use of CHP. The partnership works closely with energy users, the CHP industry, state and local governments, and other stakeholders to support the development of new projects and promote their energy, environmental, and economic benefits.

CHP Partner: Essex County New Jersey Correctional Facility

The CHP Partnership recently helped develop a project for the Essex County New Jersey Correctional Facility in Newark, New Jersey. This project will provide 6 MW of electricity, 3,300 tons of chilled water, 80 million Btus (MMBtu) per hour of hot water, and 20,000 pounds per hour of steam for the new facility. The CHP system has been integrated into the design of the facility to maximize energy efficiency results (EPA 2005a).

EPA Green Power Partnership

The Green Power Partnership is a voluntary program developed by EPA to boost the market for clean power sources that do not result in the environmental and health risks associated with conventional electricity generation. State and local governments participating in the partnership receive EPA technical assistance and public recognition (EPA 2005b).

Green Power Partner: California State University (CSU) at Hayward

CSU at Hayward received the 2004 Green Power Leadership Award for installing the largest solar electric system at any university in the world. The 1 megawatt (MW) system, which will deliver approximately 30% of the campus' peak energy demand during the summer months, is installed on four of the university's largest buildings and covers more than 110,000 square feet. The solar electric installation is expected to reduce electricity bills by $200,000 annually. CSU at Hayward received a rebate from the electric utility and from the California Public Utilities Commission (CPUC) for half the project cost. The remainder of the project is financed with a 15-year loan, and loan payments will be made out of the energy savings from the solar electric system production (EPA 2005b).

DOE State Energy Program

The State Energy Program is a federally funded program administered by DOE that provides funding and technical assistance resources to state energy offices. Many states have used State Energy Program resources to support their lead by example programs and activities (DOE 2005e).

DOE Federal Energy Management Program (FEMP)

FEMP works to reduce the operating costs and environmental impacts associated with federal facilities by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at federal facilities. Although the program focuses mainly on federal facilities, FEMP offers online information resources, an annual training conference, and workshops that are available to state and local government energy managers (DOE 2005b). The FEMP Web site also provides a

compendium of energy efficiency purchasing recommendations, interactive energy cost calculators, and other resources to help purchase energy-efficient products (DOE 2005c, DOE 2003).

DOE Building Technologies Program

The Building Technologies Program works in partnership with private and public sector organizations to improve building efficiency. This program supports research and development and provides assistance to those interested in building efficiencies through its Web site, which contains a host of tools, including guidelines, training information, and information about how to access financial resources (DOE 2005a).

The Energy Policy Act of 2005 (EPAct 2005)

EPAct 2005 (Section 125) authorizes grants of $30 million annually for each of fiscal years 2006 through 2010 to fund energy-efficient public buildings (30% above the International Energy Conservation Code [IECC]) and requires that public housing authorities purchase energy-efficient products. In addition, EPAct 2005 (Section 126) contains the Low-Income Community Energy Efficiency Pilot Program for local governments, which authorizes $20 million for each of fiscal years 2006 through 2008.

Interaction with State Policies

A variety of state programs and policies can be further leveraged by lead by example programs. Key opportunities include:

- *Procurement Policies and Accounting Methods.* Over the last 30 years, some states have modified their public procurement and accounting methods to encourage energy efficiency investments and renewable energy procurements. These innovations include:
  - Permitting long-term contracts, which are often needed for performance contracting agreements.
  - Modifying low-bid requirements, since performance contracts and other energy-saving investments might increase up-front capital costs, but produce lower overall life cycle costs.
  - Revising leasing regulations, so that private entities can be owners of equipment for tax purposes. This can be key to attracting private investment in public facilities.
  - Modifying budgeting and accounting practices, so that facilities (e.g., schools) are allowed to keep some portion of energy savings from efficiency projects. Otherwise, energy bill savings could simply result in reduced budget outlays in subsequent years and would not encourage facility managers to develop energy efficiency projects.

Best Practices: Designing Lead by Example Programs

- *Learn from Your Peers.* Consult with other states that have implemented lead by example initiatives.
- *Secure High-Level Support.* The support of top-level leadership can be critical to the successful revision of clean energy practices that affect state-owned facilities and fleets. For example, in some cases it may be appropriate for the governor (and legislature, if enabling laws are needed) to establish overall goals and/or to require specific rule changes.
- *Follow Up with Administrative Support.* While a law or executive order provides the initial structure for lead by example programs, it is also important to design a strong administrative structure. This entails (1) establishing a lead agency with the authority to implement key targets, (2) setting up a coordinating structure among affected agencies to ensure that the agencies remain involved and that targets are met, (3) developing an approach for M&V of savings, (4) developing an annual reporting system to help ensure accountability for progress and results on stated goals, and (5) ensuring that funds are available for programs that exceed current staff and budget capacities.
- *Leverage Federal Programs.* Review and assess existing federal programs to identify those that provide resources for designing and implementing a lead by example program. For example, the ENERGY STAR program provides energy efficiency specifications for products and building energy performance benchmarking tools.
- *Review and Update the Program.* Periodically (e.g., every five years or less) review and update the state's efforts to bring clean energy investments to its facilities and fleets. Expand efforts that show success and/or potential for success and revise or eliminate unproductive programs.

- Changing state budget "scoring" rules, so that performance contracting, bond issues, or other debt obligations are treated comprehensively rather than simply as costs. Even though these state obligations are often covered by guaranteed-savings agreements, legislative budget procedures often fail to give them a net savings accounting treatment.
- Requiring that state facilities procure a percentage of electricity demand from renewable resources.

- *State Bonding Authority.* States can use public financing mechanisms, such as educational, health, and environmental bond issuance authorities, to help develop clean energy projects or add clean energy features to planned facility bond issues. For example, New Jersey's Economic Development Authority, in partnership with New Jersey's Board of Public Utilities, offers a variety of incentives for renewable and energy efficiency measures.
- *Air Quality Planning.* EPA encourages states to use energy efficiency and renewable energy resources in their Clean Air Act compliance plans and related initiatives. Some states have developed specific calculation methods for quantifying the contribution that energy efficiency projects can make to emission reduction targets.

  For example, through the Texas Emissions Reduction Plan (also known as "Senate Bill 5"), Texas works with local governments to implement energy efficiency measures that will meet air quality goals through reductions in power plant emissions. (See Section 3.3, *Determining the Air Quality Benefits of Clean Energy*.)

Program Implementation and Evaluation

Because states can choose from a wide range of lead by example programs, specific design and implementation approaches might differ by program. For example, state policymakers may identify one state agency or department to administer and implement their energy efficiency programs and a different agency to lead efforts to encourage distributed generation or renewable energy. While multiple agencies may be involved in program design and implementation, the more successful state efforts typically include a multi-agency coordination structure.

Successful program implementation flows from a sound design, which in turn flows from a carefully developed overall strategy or plan. For example, some states have developed clean energy plans that set targets for percentage reductions in state facility energy use by certain dates, followed by an implementation plan that includes the specific measures, budgets, timetables, and other details needed to reach those targets.

Evaluation

Evaluation of lead by example programs is important in determining the effectiveness of an initiative. While procedures for evaluating lead by example initiatives will vary according to specific project features, the following general guidelines are applicable to all programs:

- *Develop Baselines.* Baselines will vary depending on the type of initiative. For buildings, current energy use or current building practices define baselines for energy performance. For fleets, estimated current fuel economy averages can serve as baseline data. For procurement procedures, baseline information can be based on current product specifications.
- *Measure and Verify Savings.* Develop reporting and database systems as needed to document the impacts of program initiatives. For simpler efficiency measures whose performance characteristics are well known and consistent, a deemed savings approach, which involves multiplying the number of installed measures by the estimated (or "deemed") savings per measure, is appropriate. Deemed savings values are derived from extensive field evaluations (CALMAC 2005). For larger and more complex efficiency projects, a project-specific M&V method might be more appropriate (IPMVP 2005). (For more information, see Section 4.1, *Energy Efficiency Portfolio Standards*, and Section 3.4, *Funding and Incentives*.)
- *Communicate Results.* Use monitoring and tracking information to periodically report results.

Best Practices: Implementing Lead by Example Programs

- *Coordinate Across State Agencies.* Involve multiple parties during the design, implementation, and evaluation stages of program development.
- *Assess Energy Use.* Identify opportunities for energy efficiency improvements or more efficient generation and assess the potential energy savings from these options.
- *Select Cost-Effective Measures.* Numerous handbooks and guidelines are available that provide comparative information about clean energy measures. For example, California provides sustainable building design guidelines that present both performance and prescriptive instructions regarding materials use, design principles, and construction techniques (IWMB 2005).
- *Aggregate Purchases.* When implementing an aggregated green power purchases program, the lead agency can establish contracts to procure green power or green tags. In a competitive market, suppliers can be solicited using a competitive bidding process. The selected suppliers can either provide one bill or be asked to split the billing across participants in the aggregated purchase. Purchasing green power for aggregate demand will be more effective and economically feasible in active green power markets.
- *Develop Financing Mechanisms.* A range of financing strategies is available to states for lead by example initiatives. In some cases, states may need to modify their rules to allow agencies to use certain financing mechanisms (e.g., performance contracting) or accounting methods (e.g., extended payback periods). (See Section 3.4, *Funding and Incentives,* for more detailed information on financing options.)

Present impacts in meaningful ways that document the energy, economic, and environmental benefits derived from the program.

- *Review and Reinforce Effectiveness.* Many worthy initiatives fade into inactivity after initial efforts are complete. Use evaluation efforts to ensure that innovations result in lasting changes in institutional behavior and become part of the organizational culture.

State and Local Examples

California

The California Energy Commission (CEC) administers several lead by example programs. In addition, local governments participate in state programs, and have developed their own lead by example programs.

- *California Executive Order S-20-04.* Issued in December 2004, this order requires state agencies and departments to reduce their energy consumption by 20% from 2003 levels by 2015. The order requires new and renovated state-owned facilities to meet the U.S. Green Building Council's (USGBC's) Leadership in Energy and Environmental Design (LEED) Silver certification,[5] requires state agencies to seek office space in buildings with an ENERGY STAR rating for leases of 5,000 square feet or more, and sets procurement polices for ENERGY STAR qualified electrical equipment. The order further instructs the CEC to benchmark all state-owned buildings built by 2007 and requires buildings of 50,000 square feet or more to be retro-commissioned and then re-commissioned every five years.[6] The executive order also directs the Division of the State Architect to develop new green design guidelines for public schools. Finally, it directs CPUC to ensure that its utility sector efficiency programs encourage owners of privately owned buildings to pursue similar energy efficiency and green-design measures. Both the CEC and CPUC buildings use CHP systems in

[5] USGBC certifies new buildings based on a cumulative 69-point system at several possible levels: Certified (26-32 points), Silver (33-38 points), Gold (39-51 points), and Platinum (52-69 points). Points are based on a variety of criteria, including energy efficiency, ozone impacts, site development impacts, materials choices, and indoor air quality.

[6] Retro-commissioning is defined as adjusting energy systems to operate at their intended efficiency levels. Re-commissioning is a periodic check on system performance.

their buildings to help meet these goals. Several state prisons in California also use CHP.

Web sites:
Executive Order S-20-04:
http://www.energy.ca.gov/greenbuilding/documents/executive_order_s-20-04.html

Green Building Action Plan:
http://www.energy.ca.gov/greenbuilding/documents/background/02_GREEN_BUILDING_ACTION_PLAN.PDF

- *Energy Efficiency Financing Program.* Through this program, the CEC provides low-interest loans for public schools, public hospitals, and local governments to fund energy audits and install energy efficiency measures. The interest rate for 2005 is 4.5%, and the maximum loan per application is $3 million. Recipients who complete their projects within 12 months of the loan and meet all requirements specified in the loan application receive a reduced interest rate of 4.1%. The repayment schedule is negotiable up to 15 years and is based on the annual projected energy cost savings from the aggregated projects.

  Web site:
  http://www.energy.ca.gov/efficiency/financing/

- *Energy Partnership Program.* The CEC offers this program to help cities, counties, hospitals, and other facilities target energy efficiency improvements for existing facilities and energy-efficient options for new construction. The CEC provides a variety of services including conducting energy audits, preparing feasibility studies, reviewing existing proposals and designs, developing equipment performance specifications, reviewing equipment bid specifications, and assisting with contractor selection and commissioning. The CEC also helps identify state loans and other financing sources for project installation.

  Web site:
  http://www.energy.ca.gov/efficiency/partnership/index.html

- *Oakland Energy Partnership.* The city of Oakland established the Oakland Energy Partnership to reduce energy costs and facilitate improved energy efficiency for Oakland businesses and residents. One component of the program focuses on adjusting large building systems for optimal energy use. This program is expected to reduce electricity demand by 4.6 MW and could reduce operating costs by up to 15% or $2.4 million per year across the city. Other program components involve installing energy-efficient ballasts in outdoor lighting, providing free design expertise and energy audits, and providing air conditioning tune-ups to small residential and commercial buildings.

  Web site:
  http://www.oaklandenergypartnership.com/

- *Other Local Programs.* Local governments in California are actively involved in developing or purchasing clean energy supplies. For example, in 2001, San Francisco residents passed a $100 million bond measure to fund the installation of solar power, wind power, and energy-efficient technologies on municipal property. This amount is sufficient to finance about 11 MW of solar power and 30 MW of wind power, which would account for approximately 25% of the city government's power consumption. The bonds will be paid for with energy savings from energy efficiency improvements in city facilities, thereby alleviating the need to cover the bonds with tax increases or other sources. Many other California cities have installed renewable energy systems, primarily solar PV, to power their buildings and facilities. Examples include: PV installations in a wastewater treatment facility in Oroville, a police department in Vallejo, carports in Chico, a municipal service center and bus shelters in Fresno, the Vacaville City Hall, San Diego schools, carports and the jail in Alameda County, and county buildings in Contra Costa County. In addition, San Diego is generating electricity at its wastewater facility using methane co-generation and a low-head hydro-electric generator.

  Web site:
  http://www.californiasolarcenter.org/sfbond2001.html

Colorado

Colorado was one of the first states to pass enabling legislation in the early 1990s that authorized the performance contracting approach and financing mechanisms for local governments. The Colorado Governor's Office of Energy Management and Conservation (OEMC) is the key coordinating agency for performance contracting projects. The OEMC facilitates privately funded performance contracting projects in public facilities; no state funding or financial incentives are involved. Eligible entities include school districts, state agencies, state colleges and universities, public housing authorities, cities, counties, special districts, and some nonprofit organizations (EPA 2004b). As of June 2003, the program had completed or planned $90 million in energy efficiency upgrades, with annual energy savings of nearly $9 million (see Table 3.1.1). The performance contracting program is expected to create more than 400 jobs in Colorado.

Web site:
http://www.state.co.us/oemc/rebuildco/epc.htm

Iowa

Iowa has several financing-related programs to help public and private entities implement energy-efficient and renewable energy technologies, including a building energy management program for state agencies, a revolving loan fund, and sales tax exemptions for renewable energy equipment.

- *SIFIC.* SIFIC is a nonprofit corporation established to help state agencies make cost-effective energy efficiency improvements in their buildings. The program covers all stages of the project, including feasibility assessments, financing, construction management, and energy savings monitoring. The projects are designed to pay for themselves through reduced energy use.

  Web site:
  http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/BEM/SFP/

- *The Iowa Energy Bank Program.* This energy management program combines private funds and a small amount of state and federal funding to finance energy efficiency improvements in public and nonprofit facilities, including state facilities. The program uses saved energy costs to pay for the projects. The Energy Bank conducts an energy audit and engineering analysis and negotiates financing terms with private lenders. The program goal is to implement more than $500 million in energy efficiency improvements.

  Web site:
  http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/BEM/EBANK/

Table 3.1.1: State of Colorado Performance Contracting Results Through June 2003 *($ Millions)*

	Completed Projects		Committed Projects		Total Projects	
Type of Project	Project Cost	Annual Energy Savings	Project Cost	Annual Energy Savings	Project Cost	Annual Energy Savings
School districts	$21.28	$2.32	$4.95	$0.56	$26.23	$2.88
Colleges and universities	$4.51	$0.27	$20.50	$2.52	$25.00	$2.80
Local and state buildings	$4.51	$0.27	$29.97	$2.85	$34.48	$3.12
Housing authorities	-	-	$5.00	-	$5.00	-
Total	$30.30	$2.86	$60.41	$5.93	$90.71	$8.79

Environmental Benefits (Tons/Yr)		Economic Benefits	
• Total SO_2 savings	197	• Jobs created	408
• Total NO_x savings	226	• Local economic stimulus	$36.3
• Total CO_2 savings	158,434		

Source: EPA 2004b.

- *Executive Order 41.* Iowa is joining other states in requiring its state agencies to obtain a percentage of their electricity from renewable energy sources. Executive Order 41, adopted April 22, 2005, requires state agencies to use green power for at least 10% of their electric energy consumption by 2010. Agencies may generate their own renewable energy or participate in utility green power programs, where available. The order also directs state agencies to buy energy-efficient equipment and reduce energy use in buildings by 15% (relative to energy use in 2000) by 2010. With respect to transportation, by 2010, the state's light-duty vehicle fleets (i.e., vehicles other than heavy trucks) must consist of hybrid-electric vehicles and/or vehicles that use alternative fuels, with the exception of law-enforcement vehicles. Furthermore, bulk diesel fuel purchased by the state must contain 5% renewable fuel (such as biodiesel) by 2007, increasing to 20% by 2010 (DSIRE 2005). The state will monitor the program by requiring agencies to submit quarterly progress reports.

  Web sites:
  http://www.governor.state.ia.us/legal/41_45/EO_41.pdf

  http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=IA08R&state=IA&CurrentPageID=1

New Hampshire

The state government is the largest energy user in New Hampshire, with heating, cooling, and electricity costs of more than $18 million per year. New Hampshire has implemented several projects to measure energy efficiency, track energy savings, and fund related projects for public entities.

- *Executive Order 2005-4.* This order, issued July 14, 2005, requires state agencies to reduce energy use by 10%. State staff are required to purchase equipment with an ENERGY STAR rating. All construction and renovations of state facility design criteria must exceed the state energy code by 20%. Every state agency must also implement a Clean Fleets program, requiring that all vehicles achieve at least 27.5 miles per gallon highway fuel economy to reduce energy waste (NH Press Release 2005).
- *Executive Order 2004-7.* This order requires the New Hampshire Department of Administrative Services to develop an energy information system, which includes an energy efficiency rating system. State staff are required to conduct an inventory of annual energy use by each of the state's 1,200 facilities starting in 2001 and use EPA's Energy Performance Rating System to assess each facility's energy efficiency. Procedures for tracking and reporting energy use information by each state department are currently being developed.

  The executive order also authorizes a steering committee to develop an energy reduction goal and plan, a procedure for conducting audits of facilities that score between a 40 and a 60 on the rating system, procurement policies that require ENERGY STAR products, new energy efficiency standards for new construction, and a procedure for commissioning new facilities that ensures adoption of energy-efficient design specifications and equipment operations. The executive order also establishes specific policies for the transportation sector. The order stipulates that all new vehicles purchased by the state must achieve a highway fuel economy of 30 miles per gallon or better and an emissions classification for a Low Emission Vehicle (LEV) or better. Other efficiency measures affecting transportation include the purchase of low-rolling resistance tires, an anti-idling initiative, and the promotion of ride-sharing among agencies.

  Web site:
  http://nh.gov/oep/programs/energy/beci.htm

- *Building Energy Conservation Initiative (BECI).* Established in 1997, New Hampshire's BECI provides an innovative approach for financing and tracking energy efficiency improvements in public facilities. The BECI uses a "paid from savings" procedure (also referred to as "performance contracting") that allows agencies to pay for energy retrofits and building upgrades with the energy savings from the project, rather than depending on funding through capital appropriations. Under the BECI program, a pre-qualified group of ESCOs submits

proposals to conduct the work based on a predetermined list of energy conservation measures established by the BECI. State facility managers work with performance contracting programs to analyze existing state buildings for energy and resource efficiency opportunities, such as lighting upgrades, heating, ventilation, and air conditioning (HVAC) upgrades, domestic hot water systems, energy management controls, water conservation measures, building envelope improvements, and other cost-effective measures. Measurement and verification requirements are included in each performance contracting proposal, using either a "stipulated savings" approach, in which savings are calculated before the work, or a "measured savings" approach, which involves metering and submetering to verify actual savings. Under the current arrangement, savings that exceed loan payments will revert to the state's general fund.

Building upgrades performed through the BECI have resulted in significant energy efficiency improvements and cost savings. Ten buildings have been renovated through the BECI program, including, for example, a New Hampshire Department of Justice building in Concord. Avoided energy costs for these facilities now exceed $200,000 annually (EPA 2005c). When fully implemented, it is anticipated that the BECI will be responsible for upgrades in more than 500 state-owned buildings, with energy savings of up to $4 million a year (Pew Center for Global Climate Change 2005). These energy efficiency improvements will reduce CO_2 emissions by approximately 35,000 tons per year. To date, the state has arranged two rounds of Master Lease Purchase (MLP) funding for its facilities. The latest round of $10 million brings the state's funding to approximately $25 million. Because a master lease is not considered to be additional debt, it has no negative impact on the state's credit rating (Catalyst Financial Group 2005).

Web site:
http://nh.gov/oep/programs/energy/beci.htm

New Jersey

New Jersey administers a number of programs that encourage public agencies and organizations to adopt energy efficiency and renewable energy.

- *Green Power Purchasing Program.* This program is helping to reduce the state's energy costs and support the state goal of reducing greenhouse gases to 3.5% below 1990 levels by 2005. Developed by the New Jersey Transit and the New Jersey Department of the Treasury in 1999, the innovative aggregated green power purchasing program is supplying 500 million kWh of green power to 178 state agencies. The program has expanded green energy markets in the state and encouraged increased private sector green power purchases. The reduced CO_2 emissions are equivalent to removing 32,500 cars from the road for one year.

  New Jersey formed the New Jersey Consolidated Energy Savings Program (NJCESP) to oversee and coordinate the consolidated power purchases under the Green Power Purchasing Program. This involves (1) aggregating the power purchases, both green and conventional, for the 178 public agencies, and (2) negotiating power contracts through competitive bidding in the deregulated energy market. The power supply contracts were awarded based on a fixed price per kWh. Competitive bidding allowed these agencies to obtain much lower rates than they would have independently, with an estimated $100,000 savings, and also provided economies of scale in contract administration and management. Currently, the agencies aggregating electricity purchase in New Jersey are meeting 12% of their needs with green power though green power contracts.

  Web site:
  http://www.state.nj.us/dep/dsr/bscit/GreenPower.pdf

- *Clean Energy Financing for Schools and Local Government.* This program encourages local governments and school districts to take advantage of New Jersey Clean Energy Program (NJCEP) grants and low-interest bond financing arranged by the

New Jersey Economic Development Authority (EDA) for energy efficiency and renewal energy projects. Clean Energy Financing for Schools and Local Governments offers financial incentives and low-interest financing to schools and governments. This program allows local governments and schools to develop comprehensive energy efficiency and renewable energy generation projects and to save money each month through the low-interest financing program. The program combines the traditional rebate program with incentives and financing, giving schools and local governments the flexibility to implement cost-effective projects immediately.

Web site:
http://www.njcleanenergy.com/media/CEF_Schools_and_Local_Govt_.pdf

- *Clean Energy Financing and Assistance Programs.* The New Jersey Board of Public Utilities (NJBPU), in partnership with the New Jersey Economic Development Authority, provides funding and technical assistance to New Jersey based organizations. Various programs cover grants, rebates, and project financing. For example, grants of up to $500,000 are available in the form of seed funding and commercialization assistance to assist renewable energy companies in bringing their products and technologies to market.

Web site:
http://www.njcleanenergy.com/html/Combined/cleanenergy_financing.html

New York

New York administers several lead by example programs, which are described as follows.

- *Executive Order 111, "Green and Clean" State Buildings and Vehicles.* This executive order, adopted in 2001, is an example of a state comprehensive energy efficiency and renewable energy program. It sets aggressive targets for reducing energy use in state buildings and vehicles, green power purchasing, and purchasing energy-efficient products. Executive Order 111 has been cited as the basis for strong state support for CHP, although CHP is not specifically mentioned in the order.

The order requires all agencies and departments (including state and quasi-independent agencies, such as state universities and the Metropolitan Transportation Authority) to:

- Reduce energy consumption by 35% (relative to 1990 levels) in all buildings that they own, lease, or operate, by 2010.
- Strive to meet the ENERGY STAR building criteria for energy performance and indoor environmental quality in their existing buildings. For new construction, the order directs the agencies to follow guidelines for the construction of buildings that meet LEED certification and achieve a 20% improvement in energy efficiency performance relative to the state's building code.
- Purchase ENERGY STAR-qualified products when acquiring new products or replacing existing equipment. In categories lacking ENERGY STAR products, products must meet New York State Energy Research and Development Authority's (NYSERDA's) target efficiency levels.
- Purchase increasing amounts of renewable energy and "clean fuel vehicles" by 2010.
- Purchase at least 10% of their electricity from renewable sources by 2005 and 20% by 2010. State agencies have met their renewable energy obligations through onsite generation, green power purchases from the open market, or a mix of both options.

Web site:
http://www.nyserda.org/programs/State_Government/exorder111guidelines.pdf

- *Energy $mart Loan Program.* The program is administered by NYSERDA and provides reduced interest loans (4% below the lender rate for 10 years) through an extensive network of local and regional lenders. Loan proceeds can be used to finance energy efficiency and renewable energy systems. Essentially, the program pays lenders interest subsidy payments on behalf of borrowers. Anyone can apply, including local and state government facilities. As of April 2005, NYSERDA had made 250 loans and provided interest subsidies of $5.3 million on total loans valued at $42 million through

the Energy $mart Program. The program is funded annually and expires on June 30 of each year.

Web site:
http://text.nyserda.org/Energy_Information/evaluation.asp

- *New York City Local Law 30.* On April 11, 2003, New York City enacted legislation that codifies its practice of energy-efficient purchasing, a practice dating from 1994. Local Law 30 requires that energy-using products procured by the city of New York be ENERGY STAR-labeled, provided that there are at least six manufacturers of the ENERGY STAR product. During fiscal year 2002, New York City spent $90.8 million for ENERGY STAR-labeled products, consisting mainly of computers, monitors, printers, photocopiers, fax machines, televisions, VCRs, air conditioners, and lamps.

  Web site:
  http://www.eere.energy.gov/femp/newsevents/fempfocus_article.cfm/news_id=7214

Oregon

Oregon promotes energy efficiency and renewable energy in state and local government facilities through a variety of mandated and voluntary programs.

- *State Energy Efficiency Design Program (SEED).* The mandated SEED requires all renovation and construction projects for state facilities to exceed Oregon's energy conservation building codes by at least 20%. The state's DOE administers the program and provides technical expertise on each project, helping agencies identify and design the most cost-effective energy conservation measures.

  Web site:
  http://egov.oregon.gov/ENERGY/CONS/SEED/SEEDhome.shtml

- *State Energy Loan Program (SELP).* Oregon also administers SELP, a voluntary program that provides low-interest loans for public, commercial, and residential energy efficiency projects. Eligible projects include energy production from renewable resources, using recycled materials to create products, using alternative fuels, and installing energy saving technologies such as efficiency lighting and weatherization. As of December 2004, 643 loans totaling $363 million had been made through SELP. Of these, 215 loans were for renewable energy and 428 were for energy efficiency. Program loans have varied from $20,000 to $20 million and there is no legal maximum loan. Loan terms vary from five to 15 years. The program is self-supported, using no tax dollars, and most loans are designed so the energy savings from the project equal the loan payment.

  Web site:
  http://egov.oregon.gov/ENERGY/LOANS/selphm.shtml

- *Commissioning SB 1149 Energy-Related Capital Projects.* Under its Building Commissioning program, the Oregon DOE provides technical assistance to managers of both public and private facilities. The commissioning process helps save energy by ensuring that the lighting, heating, cooling, ventilation, and other equipment in buildings work together effectively and efficiently. The state requires commissioning or retro-commissioning for specified energy-related capital projects that are funded through the state's Public Purpose Fund (established by SB 1149). This includes HVAC and/or direct digital control (DDC) capital projects exceeding $50,000, boiler and chiller capital projects exceeding $100,000, and other energy-related capital projects (e.g., lighting and lighting controls, building envelope) exceeding $150,000.

  Web site:
  http://egov.oregon.gov/ENERGY/CONS/BUS/COMM/bldgcx.shtml

- *State Business Tax Credit for Efficiency and Renewables.* Oregon's Business Energy Tax Credit (BETC) has stimulated significant business investment in energy conservation, recycling, renewable energy resources, and less-polluting transportation fuels since 1980. Any Oregon business may qualify for the tax credit, and a wide variety of businesses have benefited from the credit, including projects

in manufacturing plants, stores, offices, apartment buildings, farms, and transportation.

The tax credit is 35% of the eligible project costs (i.e., the incremental cost of the system or equipment that is beyond standard practice). The credit is taken over five years: 10% in the first and second years and 5% each year thereafter. The unused credit can be carried forward up to eight years. Recipients with eligible project costs of $20,000 or less may take the tax credit in one year. Through 2003, more than 7,400 Oregon energy tax credits have been awarded. Altogether, these investments saved or generated energy worth about $215 million a year.

A key feature of the program is its innovative "pass-through option," in which a project owner can transfer a tax credit to a pass-through partner in return for a lump-sum cash payment (the net present value of the tax credit) upon project completion. The pass-through option allows nonprofit organizations, schools, governmental agencies, tribes, and other public entities and businesses with and without tax liability to use the BETC by transferring their tax credit for an eligible project to a partner with a tax liability. Projects that use solar, wind, hydro, geothermal, biomass, or fuel cells (renewable fuels only) to produce energy, displace energy, or reclaim energy from waste may qualify for a tax credit. Renewable resource projects must replace at least 10% of the electricity, gas, or oil used.

Projects that qualify for the BETC include retrofit (including lighting and weatherization for rental properties), new construction (including energy efficiency and lighting), co-generation, renewable resource, recycled materials, and transportation projects. Retrofit projects must be 10% more energy-efficient than existing installation, and lighting retrofit must be 25% more efficient than existing lighting. For new buildings, all measures must reduce energy use by at least 10% compared to a similar building that meets the minimum requirements of the state energy code.

In 2001, the Oregon legislature added sustainable buildings to the list of measures and systems eligible for the tax credit. This addition became effective October 8, 2001 and is retroactive to January 1, 2001. In addition to several requirements set forth by the Oregon DOE, the building must meet established LEED Silver certification standards. (See Section 3.4, *Funding and Incentives*.)

Web sites:
http://egov.oregon.gov/ENERGY/CONS/BUS/BETC.shtml

http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=OR03F&state=OR&CurrentPageID=1

http://egov.oregon.gov/ENERGY/CONS/BUS/comm/commissioning.shtml

- *Local Programs*. The city of Portland, through its Office of Sustainable Development (OSD), has also been a pioneer in promoting business, residential, and government energy conservation through its City Energy Policy. Accomplishments attributable to this citywide policy include 22,000 weatherized apartment units, a 9% reduction in per capita energy use, and energy efficiency improvements installed in 40 million square feet of commercial and institutional space.

  Portland initiated the City Energy Challenge as one of its first programs to achieve the goals of its Energy Policy, to reduce energy use in city operations, and to set a good example for residents and businesses. Through projects such as innovative green power contracts, traffic signal retrofitting, and methane-powered fuel cells and microturbines, Portland has saved approximately $2 million annually, or 15% of its overall energy costs.

  Web site:
  http://www.sustainableportland.org

Texas

Texas' State Energy Conservation Office (SECO) administers and delivers a variety of energy efficiency and renewable programs in all market sectors, including state and local facilities. The Energy Systems Laboratory (ESL) at Texas A&M University provides technical assistance to SECO, local governments, and

facility managers for improving energy efficiency in buildings and calculating and quantifying the energy savings and air emission reductions from energy efficiency programs (ESL 2005). ESL has developed eCalc, a Web-based calculator that helps government and building industry users design, evaluate and track a wide range of energy savings projects that result in emission reductions.

- *Alternative Fuels Program.* The Alternative Fuels Program promotes using alternative transportation fuels in Texas by demonstrating their positive environmental impact, technical feasibility, and energy efficiency.

  Web site:
  http://www.seco.cpa.state.tx.us/alt.html

- *LoanSTAR Revolving Loan Program.* The Texas LoanSTAR (Saving Taxes and Resources) Program is SECO's most visible program. Legislatively mandated to be funded at a minimum of $95 million at all times, the LoanSTAR Program has saved Texas taxpayers over $146 million to date through energy efficiency projects, financed for state agencies, institutions of higher education, school districts, and local governments. Interest rates are currently set at 3% annual percentage rate (APR). The program's revolving loan mechanism allows borrowers to repay loans through the stream-of-cost savings generated by the funded projects.

  Web site:
  http://www.seco.cpa.state.tx.us/ls.htm

- *Performance Contracting Guidelines and Reviews.* SECO is charged with assisting state agencies with achieving greater energy efficiency, and specifically with reviewing and approving guaranteed energy savings performance contracting for state agencies.

  Web site:
  http://www.seco.cpa.state.tx.us/sa_performcontract.htm

- *Energy Efficient Partnership Program.* SECO has helped more than 400 Texas school districts identify $11 million in potential annual utility savings through participation in the Texas Comptroller of Public Account's Energy Efficient Partnership Program. Annual savings range from $325,000 for a large west Texas district to $900 for a small east Texas district with less than 300 students.

  Web site:
  http://www.seco.cpa.state.tx.us/sch-gov_partner.htm

- *Senate Bill 5, the Texas Emissions Reduction Plan.* The 77th Texas legislature passed S.B.5, known as the Texas Emissions Reduction Plan, which imposes new energy efficiency requirements on political subdivisions (i.e., cities and counties) in 38 urban and surrounding counties. The affected political subdivisions must implement energy efficiency measures designed to decrease electric consumption while improving air quality. SECO provides assistance and information to the political subdivisions to help them meet their goals of reducing energy consumption by 5% each year for five years (beginning in January 2001).

  Web site:
  http://www.seco.cpa.state.tx.us/sb5compliance.htm

- *Texas Public Finance Authority (TPFA) Master Lease Purchase Program (MLPP).* This program is a lease-revenue financing program established in 1992 to finance capital equipment acquisitions or other projects by state agencies. It can be used to finance equipment purchases (including energy equipment) of at least $10,000 that have a useful life of three years or more. Under this program, the TPFA borrows money to pay for an agency's equipment by issuing tax-exempt revenue commercial paper notes. The TPFA obtains title to the equipment and leases it to the agency, which makes lease payments to TPFA. TPFA uses the lease payments to repay the principal and interest on the commercial paper notes; the agency receives title to the equipment once the lease is fully paid.

  Web site:
  http://www.tpfa.state.tx.us/MLPPOverview.asp

What States Can Do

States have chosen from a wide variety of approaches and goals in developing their lead by example programs. These programs have reduced energy costs for state agencies, increased funding for nonenergy related expenditures, and helped stimulate development of clean energy projects and resources. States have also used lead by example programs to encourage other organizations to take actions that support clean energy.

Action Steps for States

Based on the best practices and examples of effective state programs described above, states can take the following action steps when developing their lead by example programs.

- Look across the entire government to identify opportunities for the state to lead by example on clean energy. Communicate with state agencies, local governments, schools, and other public sector organizations to identify effective ways to incorporate clean energy into their activities. Engage facility managers and agency staff for program planning, implementation, training, tracking, and evaluation.
- Explore requirements that ensure that cost-effective energy efficiency improvements are implemented in both new and existing buildings, since these have provided a major opportunity for energy savings in many states. This includes:
  - *Standards for New Buildings.* Most states require that their new facilities meet the most recent version of the ASHRAE 90.1 standard. However, some states have adopted more advanced standards, such as CEC's Title 24 Building Energy Standards (CEC 2005). Voluntary advanced building energy efficiency guidelines are available from ENERGY STAR and the New Buildings Institute (NBI 2004, ENERGY STAR 2005a). Some states have adopted green building standards (USGBC is leading this effort through its LEED certification program) (USGBC 2005). (For more information on building codes, see Section 4.3, *Building Codes for Energy Efficiency.*)
  - *Performance Targets for Existing Buildings.* Typical targets have been set at 20% reduction in current energy use per square foot of floor area, using a recent base year and setting a compliance date of between five and 15 years from enactment of the target.
- Consider procurement policies for products, equipment, and green power.
- Investigate targets for using renewable energy to power state and local facilities, allowing flexibility for different agencies to either develop onsite generation or purchase green power, depending on local conditions. States can also explore opportunities to use CHP at state facilities.
- Develop and enable financing mechanisms. States have developed a range of financing methods, including adoption of legislation or rules that ensure that state facilities can use financing strategies such as performance contracting and revolving loans. (See also Section 3.4, *Funding and Incentives.*)
- Offer staffing, technical assistance, and training to facility managers and staff on developing energy efficiency programs. Some states have established accountability structures within and between agencies so that procurement, facility management, and accounting departments are all engaged in a common effort to save energy.
- Ensure that agencies are authorized to use and are using ESCOs and performance contracting to implement energy savings projects in their facilities, if internal sources of project financing are lacking. States can adopt legislation authorizing the use of performance contracting in public facilities.

Information Resources

General Information About State and Local Programs

Title/Description	URL Address
California Energy Commission: How to Finance Public Sector Energy Efficiency Projects. Describes strategies and funding sources that public sector agencies can use to finance energy efficiency projects.	http://www.energy.ca.gov/reports/efficiency_handbooks/400-00-001A.PDF
California Energy Commission's Title 24 Building Energy Standards. Describes the energy standards for residential and nonresidential buildings.	http://www.energy.ca.gov/title24
California Energy Partnership Program. Provides technical assistance to cities, counties, special districts, public or nonprofit hospitals, public or nonprofit public care facilities, and public or nonprofit colleges/universities to improve energy efficiency in new and existing facilities, and helps arrange financing to conduct projects.	http://www.energy.ca.gov/efficiency/partnership/
California Executive Order S-20-04. This order established a goal of reducing energy use in state-owned buildings by 20% by 2015 and directs compliance with the Green Building Action Plan, which provides details on how the state can achieve these goals. The commercial sector is also encouraged to comply with these two policies. They require CEC to develop a building efficiency benchmarking system and commissioning and retro-commissioning guidelines for commercial buildings.	Executive Order S-20-04: http://www.energy.ca.gov/greenbuilding/documents/background/02_GREEN_BUILDING_ACTION_PLAN.PDF Green Building Action Plan: http://www.energy.ca.gov/greenbuilding/documents/executive_order_s-20-04.html
California Tier 1 and Tier 2 Energy Efficiency and Sustainable Building Measures Checklists. These checklists ensure energy efficiency and sustainable building measures are included in new building construction and renovations. Tier 1 checklist items have been evaluated as "cost effective" and must be incorporated into projects when part of the project scope. Tier 2 checklist items may or may not be cost-effective, but should be considered for inclusion. While the checklists include some performance standards, they are primarily prescriptive in nature.	http://www.ciwmb.ca.gov/GreenBuilding/Design/Guidelines.htm#Whole
Cape Light Compact. This regional services organization provides energy efficiency programs and aggregated power cost negotiations for its members.	http://www.capelightcompact.org/doc.ccml?24,15,215609,cap215609,,,Doc,page.html
Center for Renewable Energy and Sustainable Technology Renewable Energy Policy Project (REPP). REPP supports the advancement of renewable energy technology through policy research. REPP disseminates information, conducts research, creates policy tools, and hosts online, renewable energy discussion groups. The Web site provides information on individual state initiatives.	http://www.crest.org/
Consortium for Energy Efficiency. *State and Local Government Purchasing Model Program Plan: A Guide for Energy Efficiency Program Administrators.* Provides a step-by-step guide for developing and adopting a successful state and local government procurement program.	http://www.cee1.org/gov/purch/MPP_Final.pdf
Efficiency Vermont. Vermont's statewide energy efficiency utility provides technical assistance and financial incentives to help residents as well as public and private sector organizations identify and pay for cost-effective approaches to energy-efficient building design, construction, renovation, equipment, lighting, and appliances.	http://www.efficiencyvermont.com/index.cfm
Energy Efficiency's Next Generation: Innovation at the State Level. Provides a guide for model policy measures for energy efficiency. American Council for an Energy-Efficient Economy (ACEEE). November 2003.	http://aceee.org/pubs/e031full.pdf

Title/Description	URL Address
New Jersey Clean Energy Program. The New Jersey Board of Public Utilities administers this program, which provides information and financial incentives to help New Jersey residents, business, and communities to help reduce their energy use, lower costs, and protect the environment.	http://www.njcleanenergy.com/
New Jersey's Green Power Purchasing Program. This program allows the state to aggregate electricity purchases for 200 facilities and negotiate lower costs.	http://www.state.nj.us/dep/dsr/bscit/GreenPower.pdf
New York Executive Order 111, Annual Energy Report. This report summarizes projects implemented under Executive Order 111, estimated energy savings, and energy savings and project goals for subsequent years.	http://www.nyserda.org/programs/pdfs/execorder111finalreport7-03.pdf
New York Guidelines: Executive Order No. 111 "Green and Clean" State Buildings and Vehicles: Guidelines, Second Edition. Describes how state agencies can comply with Executive Order 111, including new construction, procuring energy-efficient products, using alternative fuel vehicles, and reporting requirements.	http://www.nyserda.org/programs/State_Government/exorder111guidelines.pdf
North Carolina State Energy Office. The Resources for Government Web page describes North Carolina's Utility Savings Initiative, a comprehensive, multi-programmed approach to reducing utility expenditures and resources in state buildings.	http://www.energync.net/home/efficiency/government.html
Oregon Building Commissioning Program. Provides technical assistance to ensure that building systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs.	http://egov.oregon.gov/ENERGY/CONS/BUS/comm/bldgcx.shtml
Oregon SEED. This program provides energy efficiency assistance for new and renovated public buildings.	http://egov.oregon.gov/ENERGY/CONS/SEED/SEEDhome.shtml
Texas A&M ESL. ESL provides tools, technical assistance, and training to help government and building industry users design and evaluate a wide range of energy savings projects.	http://energysystems.tamu.edu/ http://ecalc.tamu.edu/

Examples of Legislation and Model Language

State	Title/Description	URL Address
California	**California Executive Order S-20-04.** This executive order establishes energy conservation standards for state-owned buildings and encourages commercial building owners, local governments, and schools to take similar measures.	http://www.governor.ca.gov/state/govsite/gov_htmldisplay.jsp?sCatTitle=Exec+Order&sFilePath=/govsite/executive_orders/20041214_S-2004.html&sTitle=Executive+Order+S-20-04
	California State Administrative Manual-Energy and Water Conservation Revenue Bond Projects. This Web site describes the state Public Works Board (PWB) Lease-Revenue Bond Programs.	http://sam.dgs.ca.gov/TOC/6000/6873.htm
	California State Senate Bill ABX1 29. This bill establishes the California energy efficiency financing program.	http://info.sen.ca.gov/pub/01-02/bill/asm/ab_0001-0050/abx1_29_bill_20010412_chaptered.html
	California State Senate Bill 880 (1986). This bill helped establish the California Energy Partnership Program, which began in 1989.	http://solstice.crest.org/efficiency/irt/64.htm

State	Title/Description	URL Address
Colorado	**Colorado Energy Performance Contracting.** This Web site provides sample guidance and documents to assist with energy performance contracting.	http://www.state.co.us/oemc/rebuildco/resources/samples/default.htm
	Enabling Legislation for Performance Contracting. (See Title 29 Local Government 29-12.5-101, 29-12.5-102, 29-12.5-103, 29-12.5-104, and Title 24 State Government 24-30-2001, 24-30-2002, 24-30-2003.)	http://198.187.128.12/colorado/lpext.dll?f=templates&fn=fs-main.htm&2.0
Iowa	**Alternate Energy Revolving Loan Program: 2005 Iowa Code/Statutes.** This legislation describes program administration, eligible entities and projects, and terms of any loans made under this program.	http://nxtsearch.legis.state.ia.us/NXT/gateway.dll/moved%20code/2005%20Iowa%20Code/1?f=templates&fn=default.htm Click "Search Form" tab and enter "476.46."
	Executive Order 41. This order directs state agencies to implement cost-effective energy efficiency measures, purchase at least 10% of building energy requirements from alternative energy facilities, and use alternative fuel vehicles.	http://www.governor.state.ia.us/legal/41_45/EO_41.pdf
	Iowa Energy Bank Enabling Legislation. This bill authorizes state agencies to use lease-purchase financing for energy management improvements and authorizes loans for cost-effective energy management improvements.	http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/BEM/EBANK/LEG.PDF
	State of Iowa Facilities Investment Corporation Enabling Legislation. This legislation describes the types of energy management improvement loans SIFIC can make.	http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/BEM/SFP/files/leg.pdf
New Hampshire	**Executive Order 2004-7.** Signed in October 2004, the order requires 10% efficiency improvement in 1,200 state buildings.	http://nh.gov/oep/programs/energy/beci.htm
New York	**New York State Executive Order 111.** This order initiates a comprehensive renewable energy and energy efficiency program for New York.	http://www.gorr.state.ny.us/gorr/EO111_fulltext.htm http://www.nyserda.org/programs/exorder111orig.asp
Oregon	**Oregon State Law, ORS 276.900-915, State Agency Facility Energy Design.** This law established the Oregon SEED program in 1991. SEED helps ensure that state facilities are designed, constructed, renovated, and operated to "minimize the use of nonrenewable energy resources and to serve as models of energy efficiency."	http://www.leg.state.or.us/ors/276.html
	Senate Bill 1149. Adopted in 1999, this bill restructured the electric power industry and created a Public Purpose Fund to finance specified energy-related capital projects, including building commissioning.	http://www.leg.state.or.us/99reg/measures/sb1100.dir/sb1149.en.html
All States	**Consortium for Energy Efficiency: Model Energy Efficiency Purchasing Policy**. This document includes model language to be used by state and local governments interested in directing agencies to purchase energy-efficient products.	http://www.cee1.org/gov/purch/Purch_policy.pdf

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DOE. 2005b. FEMP.	http://www.eere.energy.gov/femp/index.cfm
DOE. 2005c. FEMP, Energy-Efficient Products.	http://www.eere.energy.gov/femp/technologies/eeproducts.cfm
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ENERGY STAR. 2005b. ENERGY STAR Partner of the Year-Leadership in Energy Management.	http://www.energystar.gov/ia/partners/pt_awards/2005_award_winner_profiles(ii).pdf
ENERGY STAR. 2005c. Purchasing & Procurement.	http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing
ENERGY STAR. 2005d. The ENERGY STAR Challenge-Build a Better World 10% at a Time.	http://www.energystar.gov/index.cfm?c=leaders.bus_challenge
EPA. 2004a. Aggregated Green Power Purchasing Case Study on New Jersey. U.S. EPA Office of Atmospheric Programs, EPA-430-F-04-34. December.	http://www.state.nj.us/dep/dsr/bscit/GreenPower.pdf (November 2003 version) or contact EPA.
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3.2 State and Regional Energy Planning

Policy Description and Objective

Summary

Energy planning is, in its broadest sense, a strategic effort to develop energy-related goals and objectives and formulate related policies and programs. As the nexus for a variety of state concerns, energy planning can serve as an umbrella mechanism for simultaneously addressing energy, environmental, economic, and other issues. Energy planning can be undertaken at both a state and regional level.

Many states have used their energy plans to support the development and use of cost-effective clean energy to help address multiple challenges including energy supply and reliability (including concerns with availability, independence, and security), energy prices, air quality and public health, and job development.

Clean energy planning (as one aspect of energy planning) has taken place in several contexts. It has been part of a broad, multi-faceted strategy that incorporates clean energy as one element (along with conventional sources and end uses), as in the New York State Energy Plan. It has been incorporated into more targeted efforts as in the California Energy Action Plan, which was developed in the wake of an electricity and natural gas crisis and sought to prioritize cost-effective, environmentally sound options. States have approached clean energy planning as an exclusive focal point, such as in the Illinois Sustainable Energy Plan. Other planning approaches have included variations of these, including government-focused lead by example strategies.

Energy planning can serve as a platform to promote or adopt significant policy initiatives including statewide clean energy goals, such as a renewable portfolio standard (RPS) or energy efficiency requirement, green power purchase levels for the state, or greenhouse gas reduction goals. The 2002 New York State Energy Plan, for example, included a renewable energy goal that helped spur the development of New York's RPS and a greenhouse gas emission reduction goal that set the stage for the governor to solicit support for a regional greenhouse gas initiative across the Northeast.

Energy planning at the state or regional level is an effective means for ensuring that clean energy is considered and used as an energy resource to help states address their multiple energy and nonenergy challenges.

Energy plans are usually developed by one or more state agencies, typically led by the state energy office. These efforts may be at the direct behest of the governor or other top official or the state legislature. Frequently, public and private sector stakeholders, such as electricity and gas utilities, environmental organizations, equipment manufacturers, and others, provide input to the plan. Implementation likewise involves a variety of agencies and stakeholders, and possibly calls for specific legislative or executive level action.

While some states require energy plans, the level of activity varies as does the scope and scale of efforts. Similarly, the inclusion of clean energy sources varies depending upon the state's circumstances. However, with all regions facing significant costs for new resources, along with heightened reliability, security, and environmental concerns, there has been increased interest in energy planning that includes consideration of the energy, economic, and environmental benefits of clean energy.

This section describes how states and regions have included clean energy in their energy planning efforts, discusses the role of various participants in the process, describes the interaction with federal and state policies or programs, and lays out several sets of best practice measures with respect to plan development, implementation, and evaluation. Chapter 2 of this Guide, *Developing a Clean Energy-Environment Action Plan,* provides additional detail on best practices for the development step, including

Examples of Clean Energy Goals from State Energy Planning Documents

Below are examples of specific, quantitative clean energy goals (including recommendations and proposed strategies) that states have included in their state energy plans or related documents:[a]

- Improve new and remodeled building efficiency by 5% and accelerate the state's RPS by adding a net average of 600 MW of new renewable generation sources annually (*California, Energy Action Plan, 2003*).
- By 2006, 2% of electricity sales generated by renewable energy; increasing annually by 1% until 2012. Reduce electricity consumption by 10% of projected annual load growth by years 2006 to 2008, rising to 25% in years 2015 to 2017 (*Illinois, Sustainable Energy*).
- Increase electricity production of solar energy in New Jersey to at least 120,000 MWh per year by 2008 (*New Jersey, Clean Energy Program Annual Report, 2003*).
- Reduce primary energy use per unit of gross state product by 25% below 1990 levels by 2010; increase renewable energy use as a percentage of primary energy use by 50% from 2002 levels to 15% by 2020; reduce greenhouse gas emissions by 5% below 1990 levels by 2010 and 10% below 1990 by 2020 (*New York, State Energy Plan, 2002*).
- State agencies and universities reduce energy consumption in existing state building to save 20% by 2008 (*North Carolina, State Energy Plan, 2003*).
- 25% of state government's total electricity needs met by new renewable energy sources by 2010 and 100% by 2025 (*Oregon, Renewable Energy Action Plan, 2005*).
- Establish a new standard for renewable energy use in the state, averaging 10% statewide by 2015 (*Wisconsin, Report to the Governor's Task Force on Energy Efficiency and Renewables, 2004*).

[a] Note that these goals are not necessarily the only ones included in a particular state plan and that additional action is generally required to implement a goal.

specifics on analytical tools, and lays out a number of action steps for states. Chapters 3 through 6 contain descriptions of 16 clean energy policies, programs, and strategies that states are pursuing and may be included in a clean energy plan. In keeping with the scope of the *Guide to Action*, this section focuses on on the electricity and natural gas sectors. The role of transportation in energy planning is an important one, however, and one that at least several states are integrating into their processes.

Objective

State and regional energy planning can further multiply state goals and leverage tools, resources, and policy opportunities from many agencies/states. States have advanced clean energy through their planning efforts by: (1) identifying and promoting a package of cost-effective options to meet energy, environment, and economic goals, (2) recognizing and assessing a full range of short- and long-term benefits from energy efficiency and renewables, (3) engaging multiple agencies and stakeholders in the state planning process and implementation, and (4) helping state agencies from different states within a region coordinate their efforts to better achieve complementary goals.

Benefits

Energy plans that incorporate environmental considerations and related cost-effective clean energy options including energy efficiency, renewable energy, and combined heat and power (CHP) have helped lay the groundwork for the efficient use of energy and state resources and helped to achieve a broad set of energy, economic, and environmental policy goals, including:

- Providing a cost-effective response to projected load growth, possibly avoiding the need for new power plants and infrastructure.
- Helping to meet challenges that load growth places on an aging system, and/or alleviating congestion and related concerns with system stability and reliability.
- Increasing energy supply diversity and security with greater reliance on domestic, regional, or in-state resources.
- Reducing energy prices and price volatility.
- Reducing the environmental footprint of energy use.

In addition, integrated energy planning efforts have yielded many policymaking benefits, including:

- Providing a framework to coordinate energy efficiency and renewable energy initiatives among state agencies and across states within a region.
- Reducing the time and costs associated with meeting existing and future environmental requirements through more efficient deployment of agency resources and efforts and adoption of least-cost and least time-intensive measures.
- Developing a climate in the state favorable to investment, innovation, and economic development of energy efficiency and renewables.
- Providing technical insights and organizational relationships that are valuable in a crisis or unexpected situation where quick decisionmaking is required.
- Conveying a sense of coherence and joint purpose to the public and other stakeholders.

State Energy Planning

States are using a variety of approaches to energy planning, ranging from establishing broad policy agendas to focusing exclusively on clean energy resources. Some states have also developed plans for how they can lead by example through government-focused initiatives. States may also look specifically at the electricity sector in their development of a clean energy plan. In addition, under the State Energy Program directed by the U.S. Department of Energy (DOE), state energy offices develop plans for how to invest support received through an annual federal funding appropriation to help promote energy efficiency and renewable energy (see *Interaction with Federal Policies* on page 3-35).

The following approaches can be adapted and combined, with the appropriate combination based on a state's priorities and resource availability:

- *Clean Energy Within a Comprehensive State Energy Plan.* Several states have developed a comprehensive energy plan that includes specific policy goals, action items, and implementation steps to increase the use of energy efficiency and renewable energy sources as one of several complementary sources. Examples include New York's State Energy Plan, Connecticut's Energy Plan, and California's Integrated Energy Policy Report and Energy Action Plan (EAP). Comprehensive energy plans have established specific targets for clean resources and identified strategies (e.g., a renewable energy and/or energy efficiency portfolio standard [EEPS]) for implementing policies and programs by a variety of state agencies. California has used its plan to prioritize clean energy as a way to meet future load growth by establishing the following "loading order" for resources: (1) conservation and energy efficiency, (2) new renewable generation, and (3) clean fossil fuel-fired central generation (CERCDC 2003). The New York State Energy Plan includes goals for improving the combined contribution of energy efficiency and renewable energy in meeting the state's energy needs.
- *Energy Plan Focused on Clean Energy.* Some states have developed a targeted energy plan that emphasizes increasing penetration of renewable resources, boosting energy efficiency, and increasing demand response. Clean energy may also be included in plans that address related issues of natural gas dependency or climate change. Examples include Illinois' Sustainable Energy Plan, New Mexico's Clean Energy Plan, Pennsylvania's Energy Harvest, and Wisconsin's Report of the Governor's Task Force on Energy Efficiency and Renewables. The Illinois plan sets a renewables goal for 2006 that at least 2% of the electricity sold to customers would come from renewables, with an annual increase of 1% until 2012. For efficiency, the goal is to reduce electricity consumption by at least 10% of projected annual load growth between 2006 and 2008, increasing to a 25% reduction from 2015 to 2017.
- *Plan for Leading by Example.* Many states have developed energy plans designed to help the state lead by example in its own use of resources. These state initiatives can jump-start the market for renewables and provide drivers for efficiency technologies and services. The lead by example

approach can be incorporated into a broad energy plan or a targeted clean energy plan, or be pursued independently. Examples of measures that a state can pursue include: adopting a renewable energy goal for the electricity consumed by the state (e.g., its office buildings, vehicle fleets), setting efficiency thresholds for the purchase of energy consuming products or equipment, and improving energy efficiency to offset projected load growth. Connecticut, Virginia, Nevada, Oregon, South Dakota, and Vermont are among the states that use this approach. Oregon has decided to increase the energy efficiency of new or remodeled state buildings by 20% or better, and existing buildings are required to reduce energy consumption by 10% relative to 2000. (See Section 3.1, *Lead by Example*, for more information.)

- *Planning by Regulated Entities.* Given their significant role in energy supply and use, states can require that regulated electricity suppliers (i.e., electric utilities or electric distribution companies) develop electricity plans that are consistent with the state's policy objectives. This effort can be connected to a broader energy planning effort or a targeted clean energy initiative, or be pursued on its own. In states where utilities are vertically integrated (the traditional approach to regulation in which generation, transmission, and distribution are provided by one entity), this takes the form of Integrated Resource Planning (IRP) (e.g., California, Minnesota, Washington). In states where the regulation of the electricity industry has been restructured, this can take the form of including clean energy in portfolio management (e.g., New Jersey, Illinois). Utilities may also develop comprehensive energy efficiency investment plans as part of their demand-side management or other efforts. IRP and portfolio management are discussed in more detail in Section 6.1, *Portfolio Management Strategies*. Utility funding for energy efficiency is discussed in Section 4.2, *Public Benefits Funds for Energy Efficiency*.

Regional Energy Planning

Regional planning typically occurs in two separate, but related, forums. Government or quasi-government entities, such as governors' associations, may develop a coordinated approach for sharing information and developing broad regional policy approaches. These planning approaches are not usually binding, with the exception of the Northwest Power Planning Council. In addition, power system operators engage in rigorous power system planning that focuses primarily on a reliable and adequate power supply for an electrical region. These regional planning approaches are described as follows.

- *Regional Plan for Policy Coordination.* In some regions, states are working together to create an energy plan that outlines shared policy goals. The Western Governors' Association (WGA) has established a Clean and Diversified Energy Advisory Council to help pursue the regional goals of 30,000 MW of clean energy by 2015 and increasing the efficiency of energy use by 20% by 2020. The New England governors have taken a coordinated approach to policy development in the areas of climate change, energy efficiency, and renewables through its New England Governors/Eastern Canadian Premiers Climate Change Action Plan, which includes the goal of increasing the amount of energy saved through conservation programs by 20% by 2025. The Coalition of Northeast Governors (CONEG) has established an Energy Working Group and is active in pursuing biomass and other renewable options.

  Regional approaches have been pursued for a variety of reasons. Some of the motivation is the regional nature of power markets and the attempt to better align policy boundaries with those of the relevant independent system operator (ISO) or similar organization (see more in the "Clean Energy in Regional Power System Planning" bullet). In addition, many regions have a long history of working collectively to pursue public policy goals, and energy policy is a natural extension of this historic relationship. Regional efforts are also attractive for states that want to move forward with the support of neighboring states to create a

"level playing field" (e.g., with respect to prices) in their region. Regional approaches can also offer opportunities for economies of scale, for instance, under aggregated purchasing efforts.

- *A Federally Mandated Regional Energy Planning Process.* The Northwest Power and Conservation Council, created by Congress in 1980, develops and maintains a regional power plan to balance the Northwest's environment and energy needs. The council is explicitly charged with incorporating cost-effective measures in its plan according to the following priorities: (1) conservation, (2) renewable resources, (3) generating resources using waste heat or generating resources of high fuel conversion efficiency, and (4) all other resources (Pacific Northwest Electric Power Planning and Conservation Act 1980).

  In addition, the Northwest Power and Conservation Council provides an example of how regional state committees can examine the role of clean energy as a resource. These examples are discussed in more detail under the *State and Regional Examples* section on page 3-38.

- *Clean Energy in Regional Power System Planning.* Regional power system operators conduct detailed ongoing planning efforts to ensure the reliable and efficient operation of the interconnected bulk electricity power systems. As such, their focus is narrower than a state energy plan that is undertaken by a government entity and reflects broader public policy goals. However, these plans increasingly attempt to consider how clean energy resources can be deployed to avoid the need for other grid resources such as new power lines. Plans are typically developed on an annual basis, with regular reviews throughout the year. The plans cover a long-term planning horizon of about 10 years. Many states participate in these regional planning processes and support consideration of energy efficiency and renewables as supply resources and as alternatives to transmission system expansion.

  There have been some efforts to formalize state participation in regional power system planning processes. For example, states in the Midwest ISO region have created a new Organization of Midwest ISO States (OMS) as a coordination vehicle for state utility commissions in their response to Midwest ISO's regional planning. OMS has a small staff and bylaws, and state commissions provide staff support. OMS is intended to coordinate the information needs and state responses to Midwest ISO regional transmission plans. This is one example of a Regional State Committee that the Federal Energy Regulatory Commission (FERC) has encouraged for state input into regional planning processes that could be used to foster clean energy planning.

Designing an Effective State or Regional Energy Plan

This section describes policy issues, approaches, and best practices for designing effective clean energy plans. The issues covered in this section are built on lessons learned from states' experiences in developing and implementing energy plans. First is a discussion of important procedural issues: determining the participants that need to be involved; assessing funding necessary to support the effort; setting the planning horizon covered by the plan and related analysis; and, determining the frequency for planning, reviews, and updates. Next, this section contains insights into interactions of energy planning with other state and federal policies.

Participants

States have found that participation by a wide variety of stakeholders results in the most effective energy planning processes. Broad participation across agencies, states, and relevant external stakeholders, facilitates information sharing, promotes the consideration of a broad range of options and related tools, and enables participants to understand how their efforts fit into the broader plan. In some states, the legislature has created a board or council that includes multiple agencies and sometimes legislators and/or other stakeholders (e.g., Connecticut Energy Advisory Board, North Carolina Energy Policy Council, New York Energy Planning Board). In other states,

the governor has formed a task force or council that includes state agencies, legislators, and sometimes a variety of external stakeholders (e.g., Delaware, Illinois, Iowa, Kansas, Kentucky, Oregon, Wisconsin). External stakeholders can play a role in developing the energy plan through meetings, public comment processes, and expert presentations. Many of the same state-level participants play similar roles in the development of regional energy plans.

- *Governor*. States have found that top-level commitment to clean energy policies and leadership on a coordinated approach is an important part of developing an effective energy policy and ensuring effective follow-through on implementing clean energy measures. The governor can establish priorities and policy objectives, and can ensure that appropriate agencies participate in the process. In recent years, governors have increasingly recognized the importance of energy planning and the link between energy, the environment, and the economy. For example, in their 2004 state of the state addresses, several governors recognized this linkage and proposed related programs or policies. A number of governors have created cabinet level task forces or similar bodies to study and/or implement clean energy policy goals (e.g., Delaware Energy Task Force, Iowa Energy Coordinating Council, Florida Energy 2020 Study Commission, New Mexico Solar Power Task Force, Oregon Renewable Energy Action Plan, West Virginia Energy Task Force, and Wisconsin Energy Efficiency and Renewables Task Force).
- *Legislature*. Legislatures have played a variety of roles. Many of the action items in an energy plan may require legislative approval and/or funding. In some states, the legislature has mandated an energy planning process. Such a mandate can help clarify clean energy priorities, ensure that appropriate agencies participate, and increase the likelihood that adequate resources are devoted to energy planning and associated implementation steps. Examples of legislative initiatives include the Connecticut Energy Advisory Board, the North Carolina Energy Policy Council, California Integrated Energy Policy Reports, and the New York State Energy Plan. In many instances, legislators serve on an energy board or council (e.g., Delaware and North Carolina).
- *State Agencies*. Agencies provide detailed knowledge and experience and dedicated resources. They are often looked to by the governor and/or legislature to define broad policy objectives, inform development of targets, develop policies and programs, identify feasible implementation steps, and develop action items. They are also key players in implementing specific programs and in reviewing plan implementation. Increasingly, states are looking to include the broadest array of agencies possible to enhance leveraging opportunities and harmonize efforts. States have included agencies covering a range of interests (e.g., education, energy, public utilities, environmental protection, transportation, housing, agriculture, economic development, consumer protection, human rights, government purchasing, administrative services) in the planning process. States may also provide their perspective as large end users.
- *Universities*. Frequently, universities play an important role in developing and implementing an energy plan. For instance, faculty might be able to secure grant funding for analytical modeling that is not available in state government. Universities can also provide a neutral forum to engage stakeholders. Faculty at the Appalachian State University spearheaded the development of the North Carolina Energy Plan; similarly, the Florida Solar Energy Center at the University of Central Florida played a major role in Florida's Energy Plan. The Center for Energy, Economic and Environmental Policy at Rutgers University serves as policy advisor and evaluator for the New Jersey Clean Energy Program and related planning efforts and as facilitator for the Clean Energy Council.
- *Utilities*. Utilities, including investor-owned, municipal, and cooperative utilities, provide technical expertise and are sources of customer information. Utilities sometimes provide input as stakeholders, and sometimes serve directly on a board or council (e.g., Delaware, North Carolina, and West Virginia). They also participate in regional power system planning processes. They are also involved in implementing and evaluating programs and policies.

- *ISOs and Regional Transmission Organizations (RTOs).* These entities initiate and lead regional transmission planning processes. They provide information and analysis of the regional power system, solicit input from market participants and state entities, and develop the regional plan. They are also involved in implementing and evaluating programs and policies.
- *Independent Power Producers, Independent Transmissions Owner, and Energy Suppliers.* One or more of these entities might be involved, depending on the issues being addressed by the energy plan. They can provide information and analysis, particularly as it relates to one of their assets (e.g., a generating source, transmission line, or pipeline). They are also involved in implementing and evaluating programs and policies.
- *Environmental and Consumer Organizations.* These organizations often provide data and analysis, ideas on program design, and feedback on proposed policies, initiatives, goals, and programs.
- *Other Private Sector Entities.* Many energy plan components are geared to motivating greater investment by the private sector in energy efficiency and renewables. The private sector also plays a key role in spurring technological innovation. Large end users, manufacturers, energy efficiency providers, and other entities that are directly affected by state energy programs might be particularly helpful in developing and implementing an energy plan. Energy planning processes can also include representatives (including management and labor) of fuel, biomass, Energy Service Companies (ESCOs), or renewables industries.
- *The Public.* States involve the general public in the energy planning process by holding pubic hearings in different parts of the state and using the media and other information distribution outlets (e.g., agency Web sites and gubernatorial addresses) to raise awareness of pending issues. The public can provide feedback as well as new ideas and input to state officials.

Funding

Funding needs arise in both developing and implementing an energy plan. Developing a state energy plan can involve contributions of staff and other resources from multiple state agencies, the governor, the legislature, and sometimes private entities. Much of this support is typically in-kind because dedicated funding streams are rare. More common is a one-time appropriation. Development often calls for sophisticated energy system modeling, ideally coupled with economic and environmental analyses. This modeling can be costly to build and maintain, and funding is often a critical issue. A state may be able to fund this work through a utility gross receipts tax or other stable funding mechanism. For example, the New York State Energy Research and Development Authority (NYSERDA) is funded in part through a statutorily prescribed assessment on the intrastate sales of New York State's investor-owned electric and gas utilities.

Implementation of the plan, such as specific action items contained in the energy plan, could require special appropriations or mechanisms for funding (e.g., through a surcharge on electricity consumers or investment from the private sector such as for an RPS). For example, the plan could include recommendations for legislative action on financing renewable energy projects, energy tax credits, and other tax incentives or for allocating funding to data collection and research.

On a regional basis, if there is an RTO, the governing board may approve the use of a wholesale tariff to help support energy planning activities.

An energy plan can also direct investment by state agencies to meet specific purchasing targets for energy efficiency and renewables. For example, specific agencies can be charged with expanding cost/benefit analyses to include benefits of renewables and efficiency, allocating agencies' funds to particular types of projects, ensuring agency incentives are consistent with overall policy, or pursuing specific demonstration projects.

Planning Horizon

Planning horizons included in energy plans vary from a few years to 15 or 20 years. A state may choose to limit the time frame based on a concern about achieving the greatest accuracy. Other states extend the horizon so that they can consider how long-term needs might be met and to more fully realize the costs and benefits of different energy resources.

Timing and Duration

There is a great variety in the timing and duration of energy planning. Some states have a regular planning cycle (ranging from once every year to once every five years) that may include a provision for updating and/or evaluating the plan in off-years (e.g., Connecticut, California, Iowa, New York, Oregon). Other states develop energy plans on a more ad-hoc basis, based on the perceived need, resource constraints, or other factors. Some states have become recently active after waiting 10 or more years before revising their energy plan (e.g., Delaware, Wisconsin, North Carolina, Florida).

Interaction with Federal Policies

Several federal programs can help support the integration of clean energy into state and regional energy planning:

- *DOE.* DOE administers the State Energy Program, which provides grants to states and directs funding to state energy offices from DOE's technology programs. States use grants to address their energy priorities and program funding to deploy emerging clean energy technologies. As part of the State Energy Program, states are required to have an energy strategy in place that describes how they will use their annual appropriation to help promote energy efficiency and renewable energy. In addition, DOE has been working with the U.S. Environmental Protection Agency (EPA) to explore how to reflect clean energy in state air quality planning (e.g., through a number of Air Quality Energy Efficiency/Renewable Energy [EE/RE] Integration Pilots and other efforts).
- *EPA.* EPA supports energy planning efforts through technical assistance, analytical tools, and outreach support on a number of clean energy topics. Key programs include the Clean Energy-Environment State Partnership Program, Green Power Partnership, Combined Heat and Power Partnership, and ENERGY STAR program. Under the Clean Energy-Environment State Partnership Program, EPA helps partner states develop a *Clean Energy-Environment Action Plan*, which is a detailed, implementation-oriented strategy document aimed at identifying, assessing, and prioritizing energy policies, programs, and measures that can achieve cost-effective environmental benefits. This *Guide to Action* helps states with their assessment by providing information, data, case studies, and guidance on relevant tools and resources for 16 clean energy policies. Specific guidance on developing a state *Clean Energy-Environment Action Plan*, including related efforts to convene a state collaborative, are presented in Chapter 2, *Developing a Clean Energy-Environment Action Plan*.
- *FERC.* FERC requires RTOs, or ISOs, to be responsible for regional transmission planning. As part of this effort, FERC has enabled the creation of Regional State Committees for states to have input into regional transmission planning. FERC has taken steps toward working on facilitating transmission access for renewables, particularly wind. For example, it has held public technical conferences on assessing the state of wind energy in wholesale electricity markets. In addition, FERC is also supporting efforts to examine the role of distributed energy resources.
- *The Energy Policy Act of 2005 (EPAct 2005).* EPAct 2005 (Section 140) authorizes grants of $5 million annually for each of fiscal years 2006 through 2010 for a pilot program for three to seven states with statewide plans for reducing electricity and natural gas consumption. The grants would be dependent on states proving independent verification of energy savings.

Interaction with State Policies

By its nature, state energy planning is often an umbrella function, providing an opportunity and mechanism to address multiple state policy objectives with participation from a full range of government and private entities. As such, it is the nexus for a variety of state policies. Many states have used energy planning as a tool for addressing environmental policy objectives simultaneously with energy policy objectives. Indeed, it is when energy objectives are considered alongside environmental and economic development objectives that clean energy can take on a more prominent role in the energy plan.

Best Practices: Developing and Adopting an Energy Plan

The best practices identified below will help states develop an energy plan that incorporates clean energy and related environmental considerations. These best practices are based on the experiences of states across the country that have developed energy plans. (See Chapter 2, *Developing a Clean Energy-Environment Action Plan,* for more detail.)

- *Create a Collaborative.* Create an advisory group to identify and assess resources and tools developed by other organizations, including state agencies, legislatures, universities, and the private sector. This group can inform the establishment of a multi-agency, multi-stakeholder collaborative process to develop a plan. At the regional level, work with ISOs and RTOs to establish processes, set policy goals, and implement programs.
- *Establish Quantitative and Other Goals.* Identify policy objectives and specific goals, including areas for agency coordination as well as specific, quantitative clean energy goals, to help guide the work of the planning agency and provide the public and other stakeholders with expectations for the outcomes. Setting a quantitative goal may be tied to one or more of the analytical steps below.
- *Forecast Energy Demand.* Develop forecasts of energy demand that are based on end uses (i.e., using detailed information on energy-using appliances/equipment, including model, size, and operating characteristics) rather than econometric drivers (i.e., "top down" drivers such as population, economic activity, weather, and more general assumptions on appliance and equipment use/penetration).
- *Assess Clean Energy Potential.* Assess the technical, economic, and achievable potential for clean energy resources to help meet forecasted demand and integrate clean energy resources fully into the analysis.
- *Examine Policy Options.* Consider how new and existing policies and programs can help expand the use of cost-effective clean energy. The *Guide to Action* describes each of the 16 clean energy policies, programs, and strategies that states have found particularly promising and may include in their state or regional clean energy plans. States may develop several scenarios, based on a range of clean energy goals or policy variations. An important element of policy development is the equitable treatment of all energy resources in any recommendations/provisions for utility cost recovery decisions (i.e., avoid potential bias toward supply-side resources and transmission investments, and avoid policy recommendations that may inadvertently set a ceiling on clean energy investments). (See Section 6.2 for a broader discussion of utility regulations and incentives, and Sections 4.2 and 5.2 for information on public benefits funds [PBFs] for energy efficiency and energy supply, respectively.)
- *Evaluate Impacts of Policy Scenarios.* Develop forecasts of energy use that include a full range of impacts for each scenario (e.g., environmental, economic, system reliability, and price).
- *Link Plan to Action.* Develop steps for plan adoption and implementation, and make action items enforceable where appropriate. Identify specific action items and schedules for individual agencies, as well as for inter-agency coordination.
- *Coordinate Implementation.* Provide for coordination of program administration and delivery—including coordination with enacting bodies (e.g., the legislature or executive branch) and implementing agencies (e.g., Public Utility Commissions [PUCs], state energy offices).

Several states have identified economic development or climate change concerns as key drivers in the shaping of their energy plan (e.g., Connecticut, Florida, Illinois, New York, Oregon, West Virginia, Wisconsin, Iowa, North Carolina, Vermont). For example, the Massachusetts Climate Protection Plan is premised on the interrelated nature of energy, environment, housing, and transportation issues. Similarly, Connecticut cites its Climate Change Action Plan as one of the key factors affecting its energy policy. State climate change action plans often include a number of clean energy policies that can help achieve greenhouse gas reductions, such as energy efficiency goals or targets, renewable energy portfolio standards, building energy codes, and provisions to increase the use of clean distributed generation. Energy plans are frequently linked to economic development and job creation. Regulatory policies that address decoupling utility profits from energy sales, portfolio management, demand response, and utility planning are also related and are discussed in Section 6.1, *Portfolio Management Strategies.*

Some states have taken specific actions to ensure that utilities provide adequate access to transmission and distribution for renewables. Many utilities are determining how best to incorporate energy efficiency and distributed generation (DG) into distribution system planning. For example, New York has been evaluating DG in distribution system planning through several regulatory proceedings. Similarly, the Massachusetts DG Collaborative has a working group on DG distribution system planning.

Program Implementation and Evaluation

Roles and Responsibilities of Implementing Organizations

- *State Agencies.* Energy plans usually include specific actions for a number of state agencies including energy offices, public utility commissions (PUCs), environmental agencies, administrative agencies (or other agencies charged with purchasing), and economic development agencies. For example, PUCs are often involved in developing efficiency plans and developing rules that specify actions regulated utilities must take to implement the policies and goals adopted in the plan. Agencies are key players in the implementation of specific programs and the review of plan implementation.

- *Legislature.* Legislative action may be required to implement certain steps of a plan, such as special tax treatment or development of funding sources. The legislature also often oversees the implementation of plans and may intervene to make course corrections or to clarify ambiguities.

- *Universities.* Universities often play a key role in energy research and development relating to clean energy options and are sometimes looked to as partners in initiatives to foster specific technologies.

- *Utilities.* Utilities (both vertically integrated and distribution-only) are essential to the implementation of certain programs, such as efficiency programs, integrating renewables into power systems, portfolio procurement, and IRP. They also participate in regional power system planning processes. Even utilities that are not regulated by the state, including municipal utilities and cooperatives, may have roles to play in program implementation.

Best Practices: Implementing Energy Plans

States can use the best practices below to implement their energy plan. These best practices are based on the experiences of states that have energy plans.

- Designate specific implementation tasks to specific agencies and staff.
- Create an entity or working group to monitor plan implementation.
- Link implementation to other policies so that state activities overall are compatible with the energy plan, including provisions that bind agencies to conduct certain activities, such as procuring certain resources or conducting key studies.
- Require each agency to develop a plan for implementing the portions of the plan for which it is responsible and to demonstrate that its activities support the goals of the plan.

Evaluation

Energy plan evaluation practices span a range of approaches from very broad review, to detailed program by program review and evaluation.

Some energy plans are primarily tools to enunciate policies and do not include a specific mechanism or procedure for reviewing and evaluating the implementation of the plan. In contrast, some plans include specific reporting requirements (e.g., to the legislature or the governor). Energy plans also can include feedback loops to guide future iterations of the plan. For example, in New York, the Energy Coordinating Working Group, comprising staff representatives of the agencies on the Energy Planning Board, issues an annual Report and Activities Update that evaluates progress toward the goals of the most recent energy plan. Similarly, Oregon's Biennial Energy Plan (2003–2005) includes a section on achievements, reviewing the results of the previous years' energy programs. Oregon's Renewable Energy Action Plan specifically charges a working group with evaluating implementation of the plan. The 2005 Connecticut Energy Plan reviews the success in implementing the 2004 Energy Plan, and includes a section on evaluating and providing a progress report as part of the energy plan. The Iowa Department of Natural Resources (DNR) prepares a comprehensive energy plan update every two years, reporting on energy consumption as well as progress in improving energy efficiency and expanding renewable energy use.

A thorough and well-documented evaluation process can help build confidence in the benefits associated with clean energy. In addition, evaluation results can help planners understand instances where projections did not materialize as expected and point to ways to address potential barriers to full policy success.

Best Practices: Evaluating Energy Plans

The best practices identified below will help states evaluate their energy plans. These best practices are based on the experiences of states that have an energy plan.

- Identify a specific schedule and steps for plan evaluation.
- Designate an entity or working group responsible for monitoring plan implementation.
- Develop a process for evaluating individual action items and success in achieving the stated objective.
- Select appropriate measures to determine the success of programs (e.g., metrics can include kWh saved, appliances sold, dollars spent, and new renewables installed) and include metrics about environmental and economic benefits and results, such as emissions saved or jobs created.
- Prepare a comprehensive report that examines all aspects of the energy plan as a whole.
- Recommend adjustments to respond to new opportunities or barriers identified in the evaluation process.

State and Regional Examples

California

As directed by the state legislature in 2002, the California Energy Commission (CEC) prepares a biennial Integrated Energy Policy Report (IEPR). The IEPR addresses issues uncovered in an integrated assessment of major energy trends and challenges facing California's electricity, natural gas, and transportation fuel sectors. It makes policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy resources; enhance the state's economy; and protect public health and safety. This includes recommendations to further the goals included in the state's EAP, described in the next paragraph. The IEPR includes a chapter dedicated to the issue of climate change and the related interactions with energy.

The EAP is a brief blueprint developed by the CEC, along with the California Public Utilities Commission (CPUC), as a "living document" to guide energy related actions throughout the state. The goal of the EAP is to ensure that energy is available and affordable, with minimal environmental risks and impacts, when and where it is needed. Other participants involved in preparing the EAP include the State Business,

Transportation, and Housing Agency; the Resources Agency; the State and Consumer Services Agency; the California Independent System Operator (CAISO); the California Environmental Protection Agency (Cal EPA); and other agencies with energy-related responsibilities.

The EAP II: Implementation Roadmap for Energy Policies, released in 2005, notes that California's energy efficiency efforts, particularly efficiency requirements for appliances and new buildings, have already reduced peak capacity needs by more than 12,000 MW and continue to save about 40,000 gigawatt-hours (GWh) of electricity annually. It adds that in 2004, the CPUC adopted further energy savings goals for electricity and natural gas. In meeting these targets, investor-owned utilities (IOUs) will save an additional 5,000 MW and 23,000 GWh per year of electricity and 450 million therms per year of natural gas by 2013. The EAP II asserts that there is more to be done and lays out a series of key actions in the areas of energy efficiency, demand response, electricity adequacy, electricity market structure, and other areas.

The original EAP, released in 2003, identifies a "loading order" for energy resources that requires (1) optimizing all strategies in conservation and energy efficiency to minimize demand increase, (2) meeting new generation needs first by renewable energy and distributed generation, and (3) supporting clean fossil fuel-fired central station generation. This loading order has since been codified in state legislation and extends the application to local publicly owned (i.e., municipal) utilities.

Web site:
http://www.energy.ca.gov/energypolicy/index.html

Connecticut

The Connecticut Legislature reconstituted the Connecticut Energy Advisory Board in 2003. The Board includes leaders from multiple state agencies who identify and coordinate state energy needs and recommend strategies and solutions. The Board provides an Annual Energy Plan to the legislature that includes specific strategies to support energy efficiency and renewable resources. The Board's 2004 Plan included a detailed assessment of energy supply and demand options and an overview of related policy opportunities and challenges. It also presented 10 energy-related strategies (and related examples of possible actions) including: continuing to support energy efficiency and conservation, supporting renewable energy technologies, supporting demand response, and supporting transportation and land use policies that reduce energy use and increase fuel diversity.

The 2005 plan reiterates the importance of those strategies and identifies several related goals including: (1) initiating and implementing by year-end 2005 a statewide public education and awareness program about the Board's recommended strategies to reduce dependence on fossil fuels, and (2) initiating legislative efforts related to the strategies identified in 2004. The 2005 plan also reported on the progress of the governor's Steering Committee (GSC) on Climate Change and the related Connecticut Climate Change Stakeholder Dialogue as a significant energy-related activity. It noted the governor's adoption of 38 recommendations made by the stakeholder group, including implementing measures to create a voluntary clean energy "choice" program for Connecticut electricity users, developing new emissions standards for cars, and using energy-efficient materials and design concepts in the construction of new state buildings.

Web site:
http://www.cerc.com/pdfs/ceabenergyplan_final05.pdf

New Mexico

The governor of New Mexico articulated a goal for New Mexico to become a leader in renewable energy and clean energy technologies. The state is also pursuing economic development goals through development of clean energy. Executive Order 2004-019 declared New Mexico the "Clean Energy State" and established an internal Clean Energy Development Council (CEDC) consisting of cabinet secretaries. The CEDC established task forces on concentrating solar power, electricity transmission, biomass, distributed solar, utility energy efficiency, and green building.

Web site:
http://www.emnrd.state.nm.us/ecmd/

New York

The New York State Energy Planning Board was created by the legislature to oversee the development and adoption of the Annual State Energy Plan. The Energy Planning Board comprises several agencies: NYSERDA, the New York State Department of Transportation (DOT), the New York State Public Service Commission (PSC), the New York State Department of Economic Development (DED), and the New York State Department of Environmental Conservation (DEC). While legislation creating the Energy Planning Board has expired, there are draft bills in both houses of the legislature to reauthorize it.

The Energy Plan includes specific goals for the contribution of energy efficiency and renewables. The 2002 Energy Plan included the following goals: (1) reduce primary energy use per unit of gross state product to 25% below 1990 levels by 2010, (2) increase renewable energy use as a percentage of primary energy use by half from 2002 levels to 15% by 2020, and (3) reduce greenhouse gas emissions 5% below 1990 levels by 2010 and 10% below 1990 levels by 2020.

An annual report provides updates documenting progress in implementing policies and recommendations contained in the plan. This report provides an update to the Energy Planning Board on actions and initiatives the state has taken to implement the strategies and recommendations in the Energy Plan. It also summarizes the data and information filed with the board by major energy suppliers in 2004, under regulations promulgated by the board. An appendix to the report contains an extensive matrix that catalogs specific initiatives and programs undertaken in response to strategies in the 2002 plan. Policy objectives for the Energy Plan include increasing energy diversity (including energy efficiency and renewables) and promoting and achieving a cleaner and healthier environment. NYSERDA conducts comprehensive tracking of energy plan implementation, including specific actions by the government and private sectors.

Web site:
http://www.dps.state.ny.us/State_Energy_Plan.html

Oregon

Under the leadership of its governor, Oregon has developed a Renewable EAP (issued April 2005). The goals of the plan are to encourage and accelerate renewable resources, stimulate economic development (particularly in rural areas), and improve the environmental future of the state. The plan is intended to be central to progress on the governor's initiatives on sustainability and global warming.

The plan establishes long-term and short-term goals. The long-term goals include: (1) new post-1999 renewables account for 10% of load by 2015—a growth rate of about 1% per year, and (2) 25% of state government electricity needs will be met using renewables by 2010, and 100% of electricity needs will be met with renewables by 2025. The short-term goals, to be achieved by 2006, include: (1) developing 300 new wind energy resources, (2) finding and implementing five solutions to transmission bottlenecks to provide access to load centers for renewables and other resources, (3) implementing specific targets for solar photovoltaic (PV), biomass, biogas, efficient CHP, fuel cells, and environmentally sound hydro, (4) ensuring that utilities offer stable price renewable products, (5) conducting a feasibility study of an RPS, and (6) meeting state government purchasing goals and others.

The plan includes specific action items for the following entities in the state: Governor's Office, Renewable Energy Working Group, Department of Energy, Economic and Community Development Department, Department of Administrative Services, Public Utility Commission, Department of Agriculture, Department of State Lands, Department of Consumer and Business Services' Building Codes Division, Oregon University System and Community Colleges, and Oregon Solutions team. The Renewable Energy Working Group is specifically charged with guiding plan implementation.

Web site:
http://egov.oregon.gov/ENERGY/RENEW/docs/FinalREAP.pdf

New England Governors' Conference (NEGC)

Governors of the six-state New England region, an informal alliance since colonial days, formally established the NEGC in 1937. The conference's goal is to promote New England's economic development. In 1981, the conference incorporated as a nonpartisan, nonprofit, tax-exempt 501(c)(3) corporation. The region's six governors serve as its board of directors. The NEGC coordinates regional policy programs in the areas of economic development, transportation, environment, energy, and health, among others. Through these efforts, the conference seeks to effectively and cost-efficiently coordinate regional policies that reflect and benefit the states.

In 2001, the NEGC and the Eastern Canadian Premiers announced a Climate Change Action Plan. This plan contains short-term, medium-term, and long-term goals for reducing greenhouse gases and includes several specific measures to promote clean energy The short-term goal is to reduce greenhouse gas emissions to 1990 levels by 2010; the medium-term goal is to reduce emissions 10% below 1990 levels by 2020; and the long-term goal is to reduce emissions by 75 to 85% below 2001 levels. To achieve these broad objectives, the plan includes goals to reduce greenhouse gas emissions from the electricity sector through clean energy options: (1) by 2025, to reduce carbon dioxide (CO_2) emissions per kilowatt-hour (kWh) of electricity by 20% from current emissions through a combination of renewable energy sources, lower carbon fuel, energy efficiency, and efficient DG, and (2) by 2025, to increase the amount of energy saved by 20% from current levels.

Web site:
http://www.negc.org/documents/NEG-ECP%20CCAP.PDF

Northwest Power and Conservation Council

Created by Congress in 1980 to coordinate the federal power system in the Northwest, the Northwest Power and Conservation Council includes two representatives from each of the four states of Idaho, Montana, Oregon, and Washington. The council develops a 20-year electric power plan for reliable energy at the lowest economic and environmental cost. The energy plan gives highest priority to cost-effective conservation, followed by renewable resources, to the extent they are cost-effective. The current plan includes specific targets and action items for conservation, demand response, and wind resources. The target for conservation is 700 average megawatt (MW) between 2005 and 2009, and 2,500 average MW over the 20-year planning horizon. (An average MW is the amount of energy delivered or saved over a year's time.) The plan also calls for over 1,100 MW of wind from system benefits charge (SBC) programs and utility integrated resource plans.

The Northwest Power and Conservation Council has created a Regional Technical Forum to develop standards to verify and evaluate energy conservation savings for system planning purposes, and assess how energy efficiency is increasingly being used as a hedging strategy to reduce risks associated with volatile electricity prices.

Web site:
http://www.nwcouncil.org/energy/powerplan/plan/Default.htm

Western Governors' Association (WGA)

The governors of the 18 states in WGA created the Clean and Diversified Energy Advisory Committee (CDEAC) in 2004 to oversee the work of the following eight task forces associated with the Clean and Diversified Energy Initiative:

- Advanced Natural Gas
  http://www.westgov.org/wga/initiatives/cdeac/Advanced Coal-full.pdf
- Biomass
  http://www.westgov.org/wga/initiatives/cdeac/biomass.htm
- Clean Coal
  http://www.westgov.org/wga/initiatives/cdeac/coal.htm
- Energy Efficiency
  http://www.westgov.org/wga/initiatives/cdeac/Energy%20Efficiency.htm
- Geothermal
  http://www.westgov.org/wga/initiatives/cdeac/geothermal.htm
- Solar
  http://www.westgov.org/wga/initiatives/cdeac/solar.htm
- Transmission
  http://www.westgov.org/wga/initiatives/cdeac/transmission.htm
- Wind
  http://www.westgov.org/wga/initiatives/cdeac/wind.htm

The governors are examining the feasibility of actions that would be needed to develop 30,000 MW of clean energy in the West by 2015, ensure adequate transmission capacity, and increase energy efficiency 20% by 2020. The Energy Efficiency Task Force of the CDEAC recently released an analysis of the potential for improving energy efficiency in the 18-state WGA region; a review of barriers inhibiting greater investment in energy efficiency; and recommendations for how the region can increase energy efficiency through policy actions such as state appliance standards, building codes, enhanced electricity and natural gas DSM, utility pricing/rate structure adjustments, public sector initiatives, and education and outreach. The analysis found that a combination of current state and utility energy efficiency policies and programs and widespread adoption of best practice policies and programs would achieve the WGA's goal of reducing electricity consumption in 2020 by 20%. The absolute electricity savings projected by 2020 are equivalent to the electricity supply of 100 baseload power plants.

Web site:
http://www.westgov.org/wga/initiatives/cdeac/

Western Interstate Energy Board (WIEB)

The WIEB is an organization of 12 western states and three Canadian provinces that operate under the auspices of WGA. WIEB conducts a broad menu of clean energy activities, including (1) helping develop a western renewable energy tracking system (Western Renewable Energy Generation Information System or WREGIS), (2) helping foster policies to enable wind energy siting and operation, and (3) developing transmission protocols that incorporate clean energy options.

Web site:
http://www.westgov.org/wieb/

What States Can Do

States and regions have approached clean energy planning in a number of ways, including as part of a broad, multi-faceted strategy that incorporates clean energy as one element of a larger energy plan, as a targeted effort, and as an exclusive focal point. Clean energy planning has also involved variations of these three approaches, including government-focused lead by example strategies. The information in this guide describes best practices for design, implementation, and evaluation; summarizes a wide range of state experiences with energy planning; and offers a variety of information resources on energy planning strategies. Based on these state examples, action steps for states that want to establish their own energy

planning programs or strengthen and expand existing programs are described in the following section.

Action Steps for States

States interested in state or regional energy planning can take the following steps:

- *Create a Collaborative*. Identify and assess resources and tools developed by other organizations, including state agencies, legislatures, universities, and the private sector. This group can inform the establishment of a multi-agency, multi-stakeholder collaborative process to develop a plan. At the regional level, work with ISOs and RTOs to establish processes, set policy goals, and implement programs.
- *Identify Policy Objectives and Specific Goals.* These goals and objectives can include areas for agency coordination as well as specific, quantitative clean energy goals, to help guide the work of the planning agency and provide the public and other stakeholders with expectations for the outcomes.
- *Analyze and Evaluate Opportunities to Incorporate Clean Energy Within State and Regional Energy Plans.* Develop forecasts of energy demand that are based on end-uses (i.e., using detailed information on energy-using appliances/equipment, including model, size, and operating characteristics), assess the technical, economic, and achievable potential for clean energy resources to help meet forecasted demand and integrate clean energy resources fully into the analysis, and consider how new and existing policies and programs can help expand the use of cost-effective clean energy. Integrate environmental and economic, as well as energy, benefits into the analysis to help further support the use of clean energy.
- *Link Plan to Action and Coordinate Implementation Across Agencies.* Develop steps for plan adoption and implementation and make action items enforceable where appropriate. Identify specific action items and schedules for individual agencies, as well as for inter-agency coordination. Provide for coordination of program administration and delivery–including coordination with enacting bodies (e.g., the legislature or executive branch) and implementing agencies (e.g., PUCs, state energy offices).

Information Resources

Information About State and Regional Plans

The following are links to individual state energy (or related) plans or planning processes. The list covers many states, but it might not contain a link to every energy plan or process available.

State	Title	URL Address
Alaska	Rural Energy Plan	http://www.akenergyauthority.org/publicationAREP.html
Arizona	Arizona Energy Infrastructure 2002	http://www.azcommerce.com/pdf/prop/sesreports/energy.pdf
California	Integrated Energy Policy Reports	http://www.energy.ca.gov/energypolicy/index.html
	EAPs	http://www.energy.ca.gov/energy_action_plan/index.html
Connecticut	Energy Plan for Connecticut	http://www.cerc.com/pdfs/ceabenergyplan_final05.pdf
Delaware	Executive Order	http://www.state.de.us/governor/orders/webexecorder31.shtml
Florida	Florida's Energy Future: Opportunities for Our Economy, Environment and Security	http://www.dep.state.fl.us/energy/pdf/fl_energy_future04.pdf
Hawaii	Hawaii Energy Strategy 2000	http://www.hawaii.gov/dbedt/ert/hes2000sum/index.html
Illinois	Sustainable Energy Plan	http://www.icc.state.il.us/ec/ecEnergy.aspx
Iowa	Iowa Energy Plan	http://www.state.ia.us/dnr/energy/MAIN/PUBS/CEP/
Kansas	2004 Kansas Energy Plan	http://www.kansasenergy.org/sercc_energyplan_2004.htm
Kentucky	Kentucky's Energy Opportunities for Our Future: A Comprehensive Energy Strategy	http://www.energy.ky.gov/energyplan/
Maine	Energy Resources Council: 2005 Work Plan and Report to the Legislature	http://www.maineenergyinfo.com/docs/erc2005workplan.pdf
Massachusetts	Climate Protection Plan	http://www.mass.gov/ocd/climate.html
Michigan	Nonprofit energy corporation to advance alternative energy technology	http://www.nextenergy.org/
Missouri	Integrated Strategic Plan	http://www.dnr.mo.gov/energy/strategicplan.htm
Montana	Montana Vision 2020	http://www.cte.umt.edu/MTFutures/mv2020.doc

State	Title	URL Address
Nevada	State of Nevada Energy Conservation Plan	Energy in state office buildings: http://dem.state.nv.us/necp2.pdf
	2003 Status of Energy in Nevada	Status of Energy in Nevada: http://energy.state.nv.us/2003%20Report/2003%20Report.htm
New Hampshire	New Hampshire's 10 Year State Energy Plan	http://www.nh.gov/oep/programs/energy/StateEnergyPlan.htm
New Jersey	An Energy Plan for the 21st Century	http://www.bpu.state.nj.us/governor/smartGrid.shtml
	New Jersey's Clean Energy Program: 2003 Annual Report	http://www.njcleanenergy.com/media/2003_NJCEP_Annual_Report.pdf
New Mexico	Governor's policy priorities	http://www.governor.state.nm.us/priorities-energy.php?mm=4
New York	New York State Energy Plan—June 2002	http://www.nyserda.org/Energy_Information/energy_state_plan.asp
North Carolina	North Carolina State Energy Plan 2003	http://www.energync.net/sep/docs/sep03.pdf
Oklahoma	Oklahoma's Energy Future: A Strategy for the Next Quarter Century	http://www.iogcc.oklaosf.state.ok.us/MISCFILE/oklahomaenergystrategy.pdf
Oregon	Renewable Energy Action Plan	http://egov.oregon.gov/ENERGY/RENEW/RenewPlan.shtml
	State of Oregon Energy Plan 2005–2007	http://egov.oregon.gov/ENERGY/docs/EnergyPlan05.pdf
South Carolina	South Carolina Energy Office, Strategic EAP 2002–2003	http://www.state.sc.us/energy/PDFs/strategic_plan_02_03.pdf
South Dakota	Statewide Energy Management, but no clean energy development plan.	http://www.state.sd.us/boa/EnergyMgt.htm
Tennessee	Report of Governor's Interagency Policy Workgroup	http://www.state.tn.us/ecd/pdf/energy/energy_policy.pdf
Texas	Energy Planning Council	http://www.rrc.state.tx.us/tepc/
Utah	State Energy Program Plan	http://www.energy.utah.gov/sep/sep.htm
Vermont	Comprehensive Energy Plan	http://publicservice.vermont.gov/pub/state-plans-compenergy.html
Virginia	The Virginia Energy Plan, December 2001	http://www.mme.state.va.us/de/chap2b.html
Washington	2005 Biennial Energy Report	http://www.cted.wa.gov/_CTED/documents/ID_1872_Publications.pdf
West Virginia	West Virginia's Energy Roadmap, 2001–2020	http://www.wvenergyroadmapworkshops.org/reports/WestVirginiaEnergyRoadmap08-20-02.pdf

State	Title	URL Address
Wisconsin	State of Wisconsin 2001 Energy Policy	http://www.wtpeople.com/energy/energypolicy062101.pdf
	Report of the Governor's Task Force on Energy Efficiency and Renewables	http://energytaskforce.wi.gov/section.asp?linkid=33
Regional Planning Organizations or Efforts	New England Governor's Conference (NEGC's) Climate Change Action Plan	http://www.negc.org/documents/NEG-ECP%20CCAP.PDF
	Northwest Power and Conservation Council	http://www.nwcouncil.org/
	Northwest Power and Conservation Council Regional Technical Forum	http://www.nwcouncil.org/energy/rtf/about.htm
	WGA Clean and Diversified Energy Initiative	http://www.westgov.org/wga/initiatives/cdeac/
	Western Interstate Energy Board (WIEB)	http://www.westgov.org/wieb/

General Articles About State and Regional Energy Planning

Title/Description	URL Address
Plugging in Renewable Energy, Grading the States. Union of Concerned Scientists. May 2003. This report evaluates the progress of individual states in renewable energy.	http://www.ucsusa.org/clean_energy/clean_energy_policies/plugging-in-renewable-energy-grading-the-states.html
Powerful Solutions: Seven Ways to Switch America to Renewable Energy, as well as State Supplements, Union of Concerned Scientists. January 1999.	http://www.ucsusa.org/clean_energy/clean_energy_policies/powerful-solutions-7-ways-to-switch-america-to-renewable-electricity.html
Powering the South: A Clean and Affordable Energy Plan for the Southern United States. Renewable Energy Policy Project. January 2002.	http://www.poweringthesouth.org/report/
Repowering the Midwest: The Clean Energy Development Plan for the Heartland. Environmental Law and Policy Center et al., 2001.	http://www.repowermidwest.org
Transmission Planning and Wind Energy. National Wind Coordinating Committee. August 2004.	http://www.nationalwind.org/publications/transmission/transbriefs/Planning.pdfs

References

Title/Description	URL Address
CERCDC. 2003. EAP. California Energy Resources Conservation and Development Commission (CERCDC), CPUC.	http://www.energy.ca.gov/energy_action_plan/
Pacific Northwest Electric Power Planning and Conservation Act. 1980. 839b(e)(1). 16 United States Code Chapter 12H (1994 & Supp. I 1995). Act of December 5, 1980, 94 Stat. 2697. Public Law No. 96-501, S. 885.	http://www.nwppc.org/library/poweract/poweract.pdf

3.3 Determining the Air Quality Benefits of Clean Energy

Policy Description and Objective

Summary

Meeting energy demand through clean energy sources can reduce emissions from fossil-fueled generators and provide many environmental and economic benefits. Some states are estimating emission reductions from their clean energy programs and incorporating those reductions into documentation for air quality planning efforts, energy planning, and clean energy program results.

States are demonstrating a number of methods to quantify the emission reductions from clean energy policies. Approaches most useful to policymakers are cost-effective, rigorous, and address relevant emission market issues.

Quantifying the precise environmental impact of a particular clean energy project can be challenging. To determine how clean energy affects air emissions, states first estimate how much generation would be displaced at which power plants. Then they can pinpoint the type and quantity of emissions that are avoided as a result of using clean energy sources. There are many opportunities and strategies for developing adequate quantification methods, depending on the purpose and scope of the clean energy program or policy.

Several states are assessing the potential for clean energy to help meet air quality requirements within their State Implementation Plans (SIPs). A SIP is the official plan a state submits to the U.S. Environmental Protection Agency (EPA) that details how the state will attain or maintain the national ambient air quality standards. States are using a variety of approaches to estimate emissions benefits, based on the characteristics of their energy resources. These relatively new efforts are identifying opportunities to overcome traditional barriers to quantification, namely complexity and cost. Recent efforts are beginning to form the "best practices" for quantifying the air quality benefits of clean energy resources.

Integrating energy efficiency and renewable energy in air quality planning offers states many opportunities and strategies to estimate emission reductions from clean energy programs.

Objective

States are estimating emission reductions from clean energy programs for a number of purposes, including:

- Incorporating emission reductions in air quality planning documents.
- Evaluating the benefits of energy programs, such as renewable portfolio standards (RPS) and public benefits funds (PBFs), and in designing new programs. (See Section 4.2, *Public Benefits Funds for Energy Efficiency*, Section 5.1, *Renewable Portfolio Standards*, and Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs*.)
- Complying with legislative requirements for reporting the effectiveness of energy programs.
- Standardizing the methods used by energy market participants who are calculating emission reductions.

Benefits

There are many benefits to calculating the emission reductions of clean energy. These efforts:

- *Add New Options for Environmental Solutions.* If an agency gains information about the air quality benefits of clean energy, the agency can choose clean energy solutions from among a list of options designed to improve the environment.
- *Potentially Reduce Compliance Costs.* Knowing the benefits and costs of alternative clean energy solutions allows an agency to better rank these programs to achieve the greatest benefits for the least

costs. This analysis can help enable an agency to determine the best way to design its programs to comply with both existing and prospective regulations.

- *Help Agencies Choose the Best Investment.* For a particular clean energy program, an agency can use information about emission reductions to determine the best investment opportunities.

States Are Determining the Air Quality Benefits of Clean Energy

Agencies in several states are working with EPA to develop methods for quantifying air emission reductions from clean energy policies and projects. States such as Texas and Wisconsin, states in the Western Regional Air Partnership (WRAP), as well as states in the Northeast have developed estimation methods appropriate for several objectives, including incorporating clean energy into air quality planning, providing comprehensive cost/benefit analyses, meeting legislative reporting requirements, and ensuring that clean energy measures are consistent with existing regulations.

- *Incorporating Clean Energy into Air Quality Planning.* State and local air quality districts are increasingly seeking emission reductions from clean energy in their plans to achieve ambient air quality standards. Air quality plans that include the impacts of energy efficiency and renewable energy are more comprehensive than plans that ignore these resources. In addition, these resources can provide cost-effective emission reductions for regions that are attempting to attain air quality standards. In some areas, the air quality benefits may not occur unless they are clearly linked to clean energy policies that are specifically added as part of the air quality planning process.

  EPA issued guidance documents in 2004 that provide clarification on how clean energy measures can fulfill the requirements of a SIP. These documents set a flexible framework for quantifying clean energy policies and address many related issues. The documents outline two approaches a state may take to include clean energy in the SIP. The first approach is to include the clean energy measure in the projected future year emission baseline. The second approach is to include the clean energy as a discrete emission reduction measure. (For more information about these guidance documents, see the *Information Resources* section on page 3-60.)

  For example, Montgomery County, Maryland, incorporated nitrogen oxide (NO_x) emission reductions associated with a renewable energy purchase into the SIP for the Washington D.C. nonattainment area and committed to retire NO_x emission allowances to ensure the emission reductions actually occur. (For more information, see *State Examples* on page 3-54.)

- *Providing Comprehensive Cost/Benefit Analyses.* Policymakers can make better decisions about air quality program design when they have complete information about the programs' costs and benefits. Different types of energy efficiency programs can result in different levels of emission reductions, and this information can guide policymakers in selecting the appropriate suite of programs for their regions. Similarly, when selecting supply-side resources, utilities and regulatory agencies need to understand the benefits of various renewable resources. For example, New Jersey disburses some of its PBFs (see Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs*) to pay for solar energy. State officials determined that the benefit of solar energy providing electricity on sunny summer days, when demand peaks and concentration levels tend to be high, justifies the cost of incentives for the photovoltaic (PV) systems.
- *Meeting Legislative Reporting Requirements.* Some regulatory agencies are under legislative mandates to periodically report on the results of their energy policies. For example, some legislatures require reporting on the cost and benefits of RPS or PBFs (see Section 4.2, *Public Benefits Funds for Energy Efficiency*, Section 5.1, *Renewable Portfolio Standards*, and Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs*), and in some cases, they require cost/benefit reports before they reauthorize the RPS or PBF. The New York State Energy Research and Development

Authority (NYSERDA) includes emission reductions as part of its reports detailing how the performance of PBFs helps achieve the state's goal to reduce environmental impacts of energy production and use.

- *Ensuring Clean Energy Measures Are Consistent with Existing Regulations.* Standardized methods for estimating emission reductions from clean energy will ensure that estimates made by different parties are accurate and comparable. They also help ensure that the estimates are consistent with other regulations such as cap and trade programs. For example, the Independent System Operator (ISO) New England's Marginal Emission Rate Analysis and the Ozone Transport Commission's (OTC's) Emission Reduction Workbook were developed so that the emission impacts of different projects and programs could be evaluated in a consistent manner (OTC 2002, ISO New England 2004).

Quantifying Air Emission Reductions from Clean Energy

Estimating the air emissions that will be avoided by clean energy programs and projects involves three key steps:

- Establishing the operating characteristics of the program or project in terms of when and how much it will reduce demand for conventional energy.
- Determining which generating units will be displaced and to what extent due to the program or project.
- Calculating the avoided emissions using the emission factors associated with the generating units.

Determining the load impact of the clean energy resource requires estimating at which times it will operate and at what levels. For example, will the energy efficiency savings be taking place on hot summer daylight hours or will it be occurring 24 hours per day, seven days a week, 52 weeks per year? Different renewable resources have different operating profiles based on the availability of, for example, wind and sunlight. Knowing the load shape of the clean energy resource is helpful in predicting which generators would most likely be backed down and, consequently, where and how many emission reductions would occur. There also may be an accounting of emissions associated with the clean energy source, such as for biomass and landfill gas.

The next step is estimating emission changes, typically by calculating the likely emission reductions based on either a model to assess which generating units will reduce generation due to the clean energy or historical trends.

- *Dispatch and Planning Models.* Dispatch models estimate the air emission effects of clean energy by identifying the marginal generating units—the units that are assumed to be displaced by the clean energy program or project. States that use this approach estimate reductions by identifying the marginal units during the hours that the clean energy resources operate and applying the expected emission rate of the units to the displaced generation. An example is the analysis performed for the Montgomery County, Maryland, wind purchase (for more information, see *State Examples* on page 3-54).

  A dispatch model is a comprehensive way to approximate plant dispatch, using software to simulate the operation of all the plants in the region. Because these models are designed to simulate all of the constraints facing power system operators, they provide realistic estimates of reduced emissions.

  Planning models are used for longer time horizons and can help discern the effect of clean energy on the construction of new plants and the retirement or modification of existing plants. For example, WRAP used the Integrated Planning Model (IPM) to analyze its renewable energy goals (for more information, see *State Examples* on page 3-54).

  Dispatch and planning models can be expensive to operate and maintain. Therefore, these models might not be an option for some uses.
- *Historic Trends Analysis.* When resources are not available to run a dispatch model, states approximate plant dispatch by looking at historical plant

How Is Electricity Dispatched?

Deciding when and how to direct power plants to operate is a complex process. As a result, calculating the air emission reductions associated with displacing some of these plants with clean energy projects is also challenging.

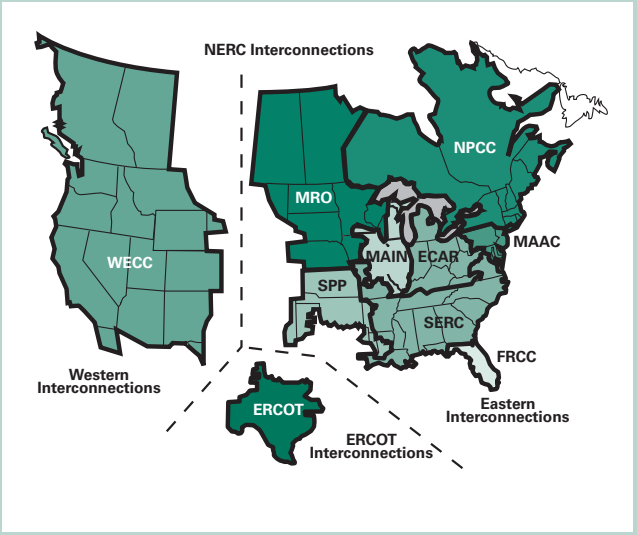
Understanding how electricity is dispatched and which power plants would be backed off at the margin by clean energy involves some key information about the U.S. electricity system. The continental United States is divided into three interconnected grids (the Eastern, Western, and Electric Reliability Council of Texas [ERCOT] Interconnections), shown in Figure 3.3.1. Within each of these grids, electricity can be imported or exported relatively easily between the numerous power control areas. However, it is difficult to transmit energy across the boundaries of these three interconnections.

The demand for electricity varies by season and by time of day. Some power plants, known as baseload units, operate almost continuously. The output of other generators rises and falls throughout the day, responding to changing electricity demand. Other generators are used as "peaking" units; these are operated only during the times of highest demand. A group of system operators across the region decides when and how to make each power plant operational or "dispatch" them according to the demand at that moment. System operators decide which power plants to dispatch next based on the cost or bid price. The power plants that are least expensive to operate are dispatched first (the baseload plants). The most expensive generating units are dispatched last (the peaking units). The fuels, generation efficiencies, control technologies, and emission rates vary greatly from plant to plant. For example, Figure 3.3.2 shows how the SO_2 and NO_x emission rates in the New York power control area vary as a function of load. Note that hydro and nuclear generators that have no air emissions meet about 7,000 megawatts (MW) of demand. To meet the need for the additional demand, system operators dispatch fossil-fired power plants that have varied NO_x and SO_2 emissions.

Other conditions also affect dispatch. Transmission constraints, when transmission lines become congested, can make it difficult to dispatch power from far away into areas of high electricity demand. Extreme weather events can decrease the ability to import or export power from neighboring areas. "Forced outages," when certain generators are temporarily not available, can also shift dispatch to other generators.

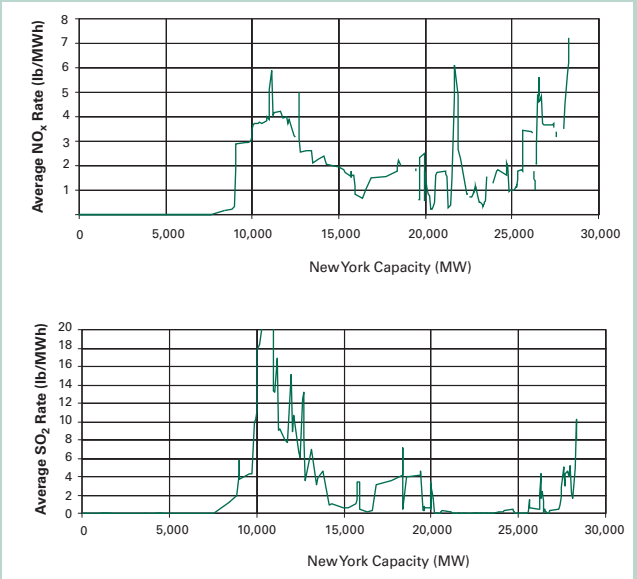
System operators must keep all these issues in mind when dispatching power plants. States can also take these issues into consideration by using dispatch models or other approaches to estimate which generators would likely reduce their output and their emissions in response to the use of clean energy.

Figure 3.3.1: Map of Interconnections



Source: NERC 2005.

Figure 3.3.2: NO_x and SO_2 Emissions by Capacity



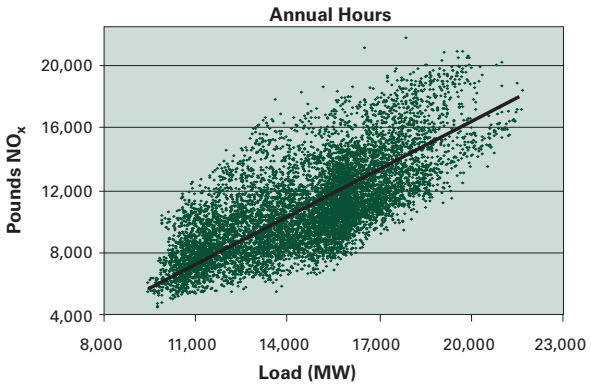
Source: Keith et al. 2002.

operations. Data on historical plant use are available from the EPA eGRID database (EPA 2005) and from the U.S. Department of Energy's (DOE's) Energy Information Administration (http://www.eia.doe.gov). Additionally, by reviewing hourly data collected by emission monitoring devices, states reconstruct how system emissions changed as loads changed during a given day or season. This approach is especially effective for assessing historical emission reductions (see Figure 3.3.3) (Keith et al. 2005). Historical analysis can also be used to project how plant emissions might be reduced in the future by clean energy.

It is possible to combine the two approaches to generate a more complete view of the power system. For example, ISO New England uses both historical information and dispatch modeling to generate its annual reports on marginal emission rates in the New England Power Pool (NEPOOL).

Finally, after considering the characteristics of clean energy projects and calculating marginal emission rates, the emission reductions can be estimated. The emission reductions are calculated by applying the emission rates of each of the electric generating units to the displaced generation at each generator.

Figure 3.3.3: Historical Emissions Data
(New England 2000)



Note: Plots of power system emissions as a function of load can be used to develop marginal emission rates during different time periods. This plot is for the New England region in 2000.

Source: Synapse Energy Economics (Date unknown).

Issues to Consider

States are developing and evaluating ways to quantify how clean energy reduces air emissions. Their efforts have highlighted a number of important issues and strategies:

- *Purpose of Quantification.* It is important to note that the proper quantification method and documentation will vary for different purposes. For example, when estimating emission reductions for use in an air quality plan (such as an SIP), a high level of rigor and comprehensive documentation are needed to meet public health and regulatory needs. To ensure that appropriate methods and documentation are used, states may contact EPA early in the process if assistance is needed. In contrast, for a report summarizing the benefits of clean energy programs, states tend to use less resource-intensive methods of quantification and documentation.
- *Prospective vs. Retrospective Analyses.* Estimates of emission reductions from both existing projects and expected new projects are useful. States have much more information about existing projects than about future projects. This information includes data about the clean energy projects and the operation of the regional power grid. With this information, states can create accurate estimates of historical emission reductions. States face more uncertainty when projecting how future clean energy projects will contribute to air quality improvements. Thus, they have found that it is important to periodically review and revise estimates related to these projects. In addition, when states perform a prospective analysis, they consider how new emission control requirements for fossil fuel generators affect their calculations. If the clean energy displaces fossil fuel generation governed by future emission control requirements, then the clean energy will have less impact on emissions in the future. For example, the analysis performed for the Texas Emission Reduction Plan updates its estimates annually and accounts for NO_x control programs imposed on the electric generators (for more information, see *State Examples* on page 3-54).

- *Power System Dispatch.* Power plants in regional electric systems are dispatched in order of increasing costs or bids. Generally, the least expensive power plants are dispatched first, and the more expensive units are directed to operate in order of cost when needed. This process is described on page 3-50, *How Is Electricity Dispatched?* Estimating dispatch is a critical and complex component to estimating emission reductions. As new methods are being demonstrated by states, new opportunities for others to use or refine the successful methods are created.
- *Energy Imports and Exports.* One of the key complexities in assessing emission reductions (either via dispatch/planning models or historical emissions analysis) lies in accounting for energy transfers between control areas. A control area is a geographic region in which most or all of the power plants are dispatched by a single set of system operators. Energy is commonly transferred among control areas via major transmission interfaces. The magnitude and pattern of energy transfers can affect the kind of emission reductions that a clean energy resource will provide. For clean energy resources located in control areas that do not import or export significant amounts of energy, energy transfers can be ignored. However, in control areas where significant amounts of energy are transferred, addressing these transactions may be an important part of the emission reduction calculations.
- *Load Pockets.* Load pockets are places within a control area where transmission constraints make it difficult to meet peak electricity loads. In a load pocket, older, less efficient generation often operates because physical constraints prevent delivery of energy from newer units. Because a clean energy resource located within a load pocket will often reduce the operation of such units, the clean energy project may have different emission impacts than other resources. Additionally, clean energy resources can reduce or delay the need for new transmission and distribution equipment. For example, for the Southwest Connecticut Clean Demand Response Pilot Project, a clean distributed generation overlay tool was envisioned to help locate ideal placement of clean technologies. The map would identify locations where technologies or applications could be most effective at addressing reliability concerns within the load pocket. It also would identify which areas would benefit most from an air quality perspective. The tool would examine the area's infrastructure, zoning, and existing developments to find areas that could be economically practical as well as technically feasible (GETF 2002).

Designing an Effective Process

This section identifies several key issues that states need to consider when quantifying emission reductions. These issues include participants, duration, evaluation, and interaction with federal policies. When designing an effective process, it is important to engage key participants, and match the purpose of the quantification with the level of rigor and cost associated with the quantification method.

Participants

- *EPA.* EPA is investigating several methods for estimating emission reductions and is working with a number of state agencies to test and compare these methods.

  EPA is working to assist states in defining potential emission reductions associated with the programs and policies outlined in this *Guide to Action* and to help states use the information to meet their environmental and energy goals. EPA is working to:

  - Identify clean energy projects and programs that may provide cost-effective emission reductions that states could capture.
  - Review methods that states can use to quantify emission reductions from clean energy and move toward best practice standards.
  - Provide states with guidance and assistance in their efforts to incorporate clean energy into air quality planning and other state initiatives.
- *DOE.* In 2004, DOE's Office of Energy Efficiency and Renewable Energy initiated pilot projects to

help states quantify the emission reductions from various clean energy programs to a level of rigor that would satisfy inclusion in air quality planning documents. These pilot projects provide the resources of DOE's contractors and national laboratories to assist states.

- *State Energy Offices.* State energy offices are involved in the design, implementation, and tracking of a variety of clean energy programs. They often track the performance of energy efficiency programs and renewable energy, and they are often required to report on these programs to legislatures. Information on emissions is an important component of energy program assessment. Data on emissions are also important to the long-term energy plans many energy offices develop.
- *State Air Pollution Control Agencies.* State air pollution control agencies are working toward including emission reductions from clean energy in air pollution control plans. This process generally starts with several case studies. State regulatory agencies also work with EPA to establish methods of quantifying emission reductions. Working with state energy office staff provides the additional expertise that may be needed for a successful process.
- *State Utility Commissions.* By involving utility commissions, states ensure that data are available for evaluating efficiency programs and the output of renewable generators. Also, coordination between utility commissions and air regulatory agencies ensures that clean energy policies are consistent with air quality regulations.
- *State Legislatures.* Lawmakers in many states have adopted clean energy programs as a way to achieve multiple goals, including air quality improvements. Based on information from utility commissions, air regulatory agencies, and energy offices, lawmakers have adopted clean energy goals, such as RPS and PBFs, designed specifically to achieve air emission reductions.
- *Electricity Market Participants.* Several market participants have an interest in quantifying emission reductions from clean energy, including energy service providers, renewable energy developers, and end users. These participants often work with state agencies to quantify and document emission reductions from clean energy.
- *Utilities.* Utilities work with air and energy regulatory agencies to review the performance of clean energy programs and to help design programs that meet both energy and air quality goals. In particular, utilities have access to information on energy generation and use that is critical to program design and review.
- *Other Researchers.* Nonprofit organizations and other groups are also evaluating how to quantify emission reductions from clean energy. Groups involved include the National Renewable Energy Laboratory (NREL), World Resources Institute (WRI), Lawrence Berkeley National Laboratory (LBNL), the National Association of Regulatory Utility Commissioners (NARUC), WRAP, and State and Territorial Air Pollution Program Administrators (STAPPA).

Timing and Duration

Electric power systems change over time. New plants and transmission lines are added and old ones are retired. These changes affect system emissions. There are two ways to address these changes when estimating emission reductions from clean energy projects. First, emission reductions can be quantified for the short term—for example, three to five years—and then updated as the power system changes. Second, states and others can make long-term projections of emission reductions using assumptions about how the power system is likely to change over time. Of course, long-term projections will only be as good as the assumptions on which they are based, so it is prudent to review these projections periodically and revise them if market conditions diverge from important assumptions.

Clean energy programs such as RPS and PBFs also include uncertainties. States quantifying the emission reductions from an RPS, for example, will include an assumption about the technologies that would generate the new renewable energy. Further, policymakers may change the RPS after several years,

perhaps increasing or decreasing the target energy levels. For both of these reasons, states periodically review projections of emission reductions from clean energy programs and make adjustments when necessary.

Evaluation

States periodically evaluate their clean energy programs to ensure that predicted emission reductions are being realized. For example, a state might assume that an RPS will result in 100,000 megawatt-hours (MWh) of new renewable energy generation each year. The state would then verify this assumption once the data become available. To accomplish this, states typically use established measurement and verification (M&V) techniques for clean energy. Energy production is measured either at the point of generation (gross generation) or at the connection point to the electric grid (accounting for any in-plant use). There are various standard protocols to evaluate the performance of energy efficiency projects, including some that use customers' energy consumption records.

Understanding the types of clean energy program evaluations that will be needed helps a state determine the appropriate methods to perform both the initial prospective estimates of emission reductions and the retrospective evaluation of actual emission reductions. For example, legislatively mandated policies may require more rigorous evaluation than voluntary efforts. Policies that address energy supply may require different data to be collected and evaluated than policies that address energy demand. Considering the need for future evaluation ensures that the initial estimates will be sufficient to provide a basis for evaluation.

Interaction with Federal Policies

Some states are working with EPA to include clean energy as an emission reduction measure in a SIP. EPA released several documents that address how to accomplish this. These documents are: *Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures* and *Incorporating Emerging and Voluntary Measures in a State Implementation Plan* (for more information, see *Information Resources* on page 3-60).

States quantifying emission reductions from energy efficiency and renewable energy consider the effects of any applicable cap and trade programs. Under these programs, air regulatory agencies cap total emissions within a region. Allowances are allocated to generators. Generators may buy and sell allowances, but they must hold one allowance for each ton of pollution emitted. Typically, the level of the cap declines over time to meet air quality objectives. Subsequently, generators need to adopt more emission control strategies over time.

Because emission allowances can be traded in a cap and trade area, it is important to consider two main issues: how much clean energy is implicitly assumed to occur in the design of the cap and trade program and how many allowances need to be retired to ensure the emission reductions from clean energy programs actually occur and endure.

State Examples

The Texas Emission Reduction Plan

In 2001, the 77th Texas Legislature passed Senate Bill 5 (S.B.5), the Texas Emissions Reduction Plan, calling for energy efficiency and reduced electricity consumption to help the state comply with U.S. Clean Air Act standards. Forty-one urban and surrounding counties were required to:

- Implement all cost-effective energy efficiency measures to reduce electric consumption by existing facilities.
- Adopt a goal of reducing electric consumption by 5% a year for five years, beginning January 1, 2002.
- Report annually to the State Energy Conservation Office.

In 2002 and 2003, the Texas Commission on Environmental Quality (TCEQ) revised SIPs for the Houston-Galveston and Dallas-Ft. Worth areas. Early energy savings and emission reductions estimates relied on assumptions about the communities' level of commitment to the 5% per year goal. Projects eligible for inclusion in the SIP include efficiency and renewable projects such as: building code upgrades, energy efficiency retrofits, renewable energy installations, and green power purchases.

The TCEQ worked with EPA, ERCOT, and Texas A&M University's Energy Systems Laboratory (ESL) to develop a methodology for quantifying the NO_x emission reductions associated with energy savings from clean energy projects. The methodology was used to prepare emission reduction estimates for each power plant in the ERCOT region. The groups then submitted these estimates to relevant counties. EPA's eGRID provided much of the data about electricity production, source, fuel mix, and emissions. This information was used to estimate demand and emission reductions in Texas (Haberl et al. 2003).

The purpose of the air emission reduction estimates was to include the NO_x emission reductions as discrete emission reduction measures in the air quality planning process for ground level ozone. The estimate is a prospective analysis. The analytic approach was based on historic trends analysis of operational data with modifications based on future emission controls, planned plant shutdowns, and planned new plants. The few imports and exports outside the ERCOT were ignored. The historic trends analysis was not able to accommodate explicit consideration of load pockets. Ultimately, the Houston area reductions were not included in the SIP due to a local cap and trade program.

Web site:
http://www.tnrcc.state.tx.us/oprd/sips/mar2003dfw.html#revision

Western Regional Air Partnership

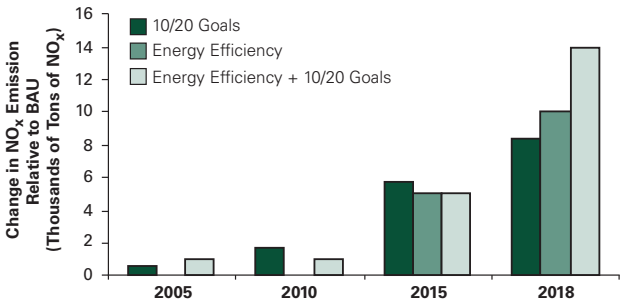
In 1996, the Grand Canyon Visibility Transport Commission (GCVTC) issued a report saying states that contribute to regional haze in the West should incorporate 10% renewable energy into their resource mix by 2005 and 20% by 2015.

In 1997, western states and tribes established WRAP to help implement the GCVTC's recommendations. In 1999, EPA's Regional Haze Rule required nine western states to prepare SIPs addressing regional haze. The rule specifically allowed those states to develop and implement regional approaches to improve visibility. Five states in the Transport Region (Arizona, New Mexico, Oregon, Utah, and Wyoming) chose to implement this regional approach and submitted their SIPs in December 2003.

As part of its SIP, each state lists policies and programs at the regional and state levels that will help achieve the 10 and 20% goals (often indicated as the 10/20 goals). These programs include RPS, PBFs, renewable energy purchases, net metering (when excess electricity produced by an electricity customer will spin the electricity meter backwards), green power marketing, as well as tax credits and other financial incentives. In addition, states may pursue clean energy initiatives that are not included in the SIP submissions.

The Air Pollution Prevention forum of WRAP commissioned a detailed study of the impacts of policies that achieve the 10/20 goals. When both the 10/20 goals and the energy efficiency recommendations are implemented, NO_x emissions are expected to be reduced by about 14,000 tons in 2018 (see Figure 3.3.4), and carbon dioxide (CO_2) emissions by about 56 million metric tons. These impacts represent about a 2% reduction of NO_x emissions and about a 14% reduction of CO_2 emissions. The net avoided cost savings is expected to increase to about $1.8 billion in 2018. Annual electricity production costs through 2022 will be reduced by about $751 million.

Figure 3.3.4: Estimated NO_x Reductions from Energy Efficiency/Renewable Energy (EE/RE)



Source: WRAP 2003.

Although energy efficiency and renewable energy reduce conventional electric generation requirements, they do not necessarily yield SO_2 reductions. In this case, the regional SO_2 cap and trade program was assumed to be in effect. As such, the renewable energy and energy efficiency was projected to reduce the cost of complying with the cap and trade program and reduce allowance prices rather than reduce emissions significantly. In this context, increasing the use of EE/RE reduces the costs of complying with the SO_2 milestones in the Annex to the Regional Haze Rule developed by WRAP (APPF 2002, WRAP 2003).

The purpose of the air emission reduction estimates was to determine the how much the GCVTC's recommendations would help the region achieve its regional haze goals. The estimates are a prospective analysis. The analytic approach was based on a planning model. Imports and exports within the western grid were considered. The large regional planning model analysis was not able to accommodate explicit consideration of load pockets. Cap and trade program analysis was an integral part of the planning model.

Web site:
http://www.wrapair.org/forums/ap2/

Analyzing Efficiency Programs in Wisconsin

The Wisconsin Department of Administration (DOA) recently funded an analysis of the emission impacts of the state's energy efficiency programs. Recognizing that efficiency programs have multiple impacts (i.e., energy savings, demand reductions, and emission reductions), the DOA wanted to obtain better information about how programs could be targeted toward certain objectives.

To analyze how efficiency programs affected air emissions, the evaluation team used EPA continuous emission monitoring data on historical plant operations and emissions to estimate which generating plants were "on the margin" during different time periods. These are the plants scheduled to become operational next—when the less expensive plants are running at full capacity.

In this case, the DOA identified the units "on the margin" for given hours. These units are important in calculations because they are the units that are displaced by energy efficiency or clean energy.

The DOA developed emissions factors for the marginal generating units for different time periods (e.g., peak and off-peak hours during winter and summer). The DOA then used these factors to analyze the effects of different energy efficiency programs.

The study found that the marginal units' emission rates tend to be higher during off-peak hours than on-peak hours, particularly winter off-peak hours (see Figure 3.3.5). This suggests that energy savings in off-peak hours produce the largest emissions savings in Wisconsin (Erickson et al. 2004). This is valuable information, given that savings during peak hours are considered to be most valuable to the power system (because peak savings reduce demand during high-demand periods). With this information, policymakers are better able to refine the state's efficiency programs to meet different objectives as the power system evolves.

Figure 3.3.5: Marginal Emission Rates in Wisconsin

Season and Hour	Pounds /MWh			Pounds /GWh	Percent of Yearly Value			
	NO_X	SO_X	CO_2	Mercury	NO_X	SO_X	CO_2	Mercury
Yearly	5.7	12.2	2.215	0.0489				
Broad Peak Scenario								
Winter Peak	5.9	13.9	2.027	0.0427	104%	114%	91%	87%
Winter Off-peak	5.8	14.5	2.287	0.0536	102%	119%	103%	110%
Summer Peak	4.6	9.8	1.788	0.0346	81%	80%	81%	71%
Summer Off-peak	5.4	11.1	2.233	0.0524	95%	91%	101%	107%
Narrow Peak Scenario								
Winter Peak	No Winter Peak Hours							
Winter Off-peak	5.1	11.0	2.078	0.0461	39%	90%	94%	94%
Summer Peak	2.9	6.0	1.476	0.0181	51%	49%	67%	37%
Summer Off-peak	5.4	11.2	2.073	0.0431	95%	92%	94%	88%

Source: Erickson et al. 2004.

The purpose of this analysis was to update emission reduction factors being used to evaluate the PBF program in Wisconsin. The analytic approach as a load-duration curve dispatch model. The estimates are a retrospective analysis. The analysis includes consideration of dispatch within the Mid-Atlantic Interconnected Network (MAIN) and Midwest Reliability Organization (MRO) (previously named Mid-Continent Area Power Pool [MAPP]) North American Electric Reliability Council regions (see Figure 3.3.1 on page 3-50). The model did not explicitly define load pockets. The affect of cap and trade systems was not included in the emission reduction estimates.

Web site:
http://www.doa.state.wi.us/docs_view2.asp?docid=2404

Performance Contracting in Shreveport, Louisiana

As part of its SIP revision under sections 110 and 116 of the Clean Air Act and in support of control measures for the purpose of attaining and maintaining the 8-hour ozone standard, the Louisiana Department of Environmental Quality (DEQ) submitted an Early Action Compact SIP for the Shreveport area to EPA on December 28, 2004. The SIP included the emission reductions expected to be achieved from performance contracting at particular municipal buildings in Shreveport. The performance contract is expected to save the city 9,121 MWh of electricity per year and achieve NO_x emission reductions of 0.041 tons per ozone season-day.

The city arrived at this figure after employing several different methods of determining the emissions avoided through its programs (Chambers et al. 2005). EPA Region 6 published proposed approval of this SIP revision in the *Federal Register* at 70 FR 25000, May 12, 2005, and published final approval at 70 FR 48880, August 22, 2005.

The purpose of this emission reduction analysis was to include the emission reductions within its SIP. The analytic approach was a comparison of results from an economic dispatch model and two historic trends analysis. The analysis is retrospective (year 2000). The economic dispatch analysis included consideration of dispatch within two power control areas that provide electricity in the Shreveport area. The model did not explicitly define load pockets. The affect of cap and trade systems was not included in the emission reduction estimates.

Wind Power Purchase in Montgomery County, Maryland

Montgomery County, Maryland, committed to purchase 5% of its municipal electricity from wind power through renewable energy credits (RECs). It incorporated the emission reductions for ground-level ozone in the SIP for the Washington D.C. metropolitan area.

The county made the business case for purchasing the renewable energy by demonstrating that the energy savings realized by very low cost energy efficiency measures would offset the incremental cost of the renewable energy purchase. The county also demonstrated that the emission reductions from the renewable energy purchase were less expensive on a dollar per ton basis than other measures.

The expected emission reduction for the 30,000 MWh per year of renewable energy is estimated to be 0.05 tons of NO_x per day during the ozone season. To arrive at this estimate, the county employed a dispatch model covering the electricity grid in the western part of PJM Interconnection, which is the regional transmission organization that coordinates the dispatch of wholesale electricity in the region.

As mentioned previously, the state of Maryland committed to retire the NO_x allowances associated with the claimed emission reductions (i.e., to permanently remove the allowances from the market and prevent their use). This is how the county met the requirements of the SIP measure (MWCOG 2004). EPA Region 3 published final approval of this revision to the SIP in the *Federal Register* (70 FR 24987, May 12, 2005).

The purpose of this quantification procedure was to provide NO_x emission reduction figures to be used in the Washington, D.C. SIP. The analytic approach was based on an economic dispatch model. The analysis is prospective. The economic dispatch analysis included consideration of dispatch within the power control area of the region. The model did not explicitly define load pockets. Although cap and trade systems were not included in the emission reduction estimates, the retirement of emission allowances equivalent to the estimated emission reductions were included in the SIP.

Web site:
http://www.mwcog.org/environment/air/SIP/default.asp

On the Horizon

Some state air quality officials are beginning to express interest in environmental dispatch of electricity generators. This concept would alter the way electricity generators are dispatched from a purely economic basis to one that incorporates some consideration of environmental emissions into the dispatch order. Emissions analysis coupled with air quality modeling could provide useful analytical information to help evaluate the conditions under which environmental dispatch may achieve significant benefits for the least cost. For example, if there are periods of time when the air quality is most vulnerable to additional emissions from power generation, the benefits of dispatching cleaner yet more expensive units may outweigh the additional cost. Additionally, if such conditions occur infrequently during the entire year, the overall cost increase to retail electricity customers could be negligible.

Some states are also interested in tracking emission reductions of CO_2 in addition to criteria air pollutants. The quantification methods discussed in the *Guide to Action* will be critical to these efforts. Unlike technologies to control air pollutants like NO_x and SO_2, technologies are currently not widely used to capture and control CO_2 emissions from the emission stacks of electricity generators. Therefore, for the near future, most CO_2 emission reductions will generally come from renewable energy sources and improved efficiency.

A number of states are developing voluntary CO_2 reduction goals, and a growing number of companies are developing voluntary greenhouse gas strategies. They are working with the Greenhouse Gas Protocol Initiative, states, and EPA to document their efforts. Other states are incorporating CO_2 reduction into long-term planning requirements for utilities, or requiring utilities to offset their greenhouse gas emissions from power plants with investments in renewable energy, energy efficiency, and other measures such as carbon sequestration. Several states are developing tracking programs to support such requirement and companies' voluntary tracking efforts. Table 3.3.1 briefly describes CO_2 reductions efforts under way.

Table 3.3.1: Existing Policies to Reduce CO_2 Emissions

Policy/Description	For More Information
Tracking Progress Toward State Goals. New York and New Jersey have both adopted goals for greenhouse gas reductions, as have groups of states in New England and on the West Coast.	• New Jersey Department of Environmental Protection (DEP), *New Jersey Sustainability Greenhouse Gas Action Plan,* April 2000. http://www.state.nj.us/dep/dsr/gcc/gcc.htm • *New York State Energy Plan,* 2002. http://www.nyserda.org • New England Governors and Eastern Canadian Premiers (NEG/ECP): *Climate Change Action Plan: 2001,* August, 2001.
CO_2 Offset Requirements. Massachusetts and New Hampshire require large, fossil-fueled power plants to offset a portion of their CO_2 emissions. Massachusetts, Oregon, and Washington require new power plants to offset emissions.	• MA DEP, Emission Standards for Power Plants (310 CMR 7.29). • *New Hampshire Clean Power Act* (HB 284) approved May, 2002. • Oregon Climate Trust. http://www.climatetrust.org
CO_2 Adders in Resource Planning. The California Public Utility Commission (CPUC) has developed an "imputed" cost for greenhouse gas emissions for use in utility planning. In addition, several utilities (PG&E, Avista, Portland General Electric, Xcel, Idaho Power, and PacifiCorp) have voluntarily used CO_2 cost adders in resource planning.	• CPUC, Decision 04-12-048, December 16, 2004. http://www.cpuc.ca.gov/PUBLISHED/AGENDA_DECISION/42314.HTM
Voluntary Quantification Efforts. Many companies have begun tracking their annual greenhouse gas emissions and taking steps to reduce emissions. These companies are using a variety of methods for calculating emission reductions.	• EPA's Climate Leaders program offers inventory guidance for companies that voluntarily participate in the program. http://www.epa.gov/climateleaders • Information on these efforts and tracking protocols used is available from the Greenhouse Gas Protocol Initiative. http://www.ghgprotocol.org • Information in voluntary efforts in California is available from the California Climate Action Registry. http://www.climateregistry.org

What States Can Do

To begin capturing the benefits of clean energy programs, states can identify ways to use emission reduction data, quantify emission reductions, identify programs and policies that provide reductions, and document reduction estimates.

Action Steps for States

- *Begin Identifying Ways to Use the Air Emission Reductions That Result from Clean Energy Programs.* Emission reduction data can be included in air quality plans and used in evaluating existing clean energy programs, developing new clean energy programs, and preparing reports to legislatures and the public. These different uses may require different quantification and documentation methods; thus, it is important to identify possible uses before developing emission reduction data.
- *Identify Clean Energy Programs That May Provide Emission Reductions.* Many states have a range of clean energy policies (e.g., energy efficiency goals, RPS, PBFs, and appliance standards) that may result in emission reductions. Other programs may also provide emission reductions. These include enhanced building codes, green power purchases, net metering, tax incentives, and other financial incentives. The information resources on page 3-60

present data on clean energy programs that states have focused on to date.

- *Quantify Emission Reductions from Clean Energy Projects and Programs.* States can use a number of methods to quantify emission reductions from clean energy, including simple approaches that are based on estimates of average fossil generation emission rates. More resource-intensive approaches are based on system dispatch modeling. The previous section on quantifying emission reductions provides a general overview of the key issues involved in quantification. The information resources provided below document a number of quantification efforts. States can talk with EPA to help identify the appropriate methods. As discussed, the proper quantification method and documentation requirements will vary, depending on the purpose of the effort.
- *Document Emission Reduction Estimates.* Documenting emission reduction estimates in as much detail as possible is an important step. When developing emission reduction estimates for an air quality plan, contact EPA early in the process to discuss methods and documentation requirements (see EPA's *Incorporating Emerging and Voluntary Measures in a State Implementation Plan* [EPA 2004] for guidance). States are encouraged to seek information from other states and disseminate emission reduction studies widely to facilitate the movement toward standardized best practices. Documenting and publishing reports on emission reduction quantification efforts is one way to advance the art of quantification methods.

Information Resources

The resources cited as follows provide more information about methods of quantifying emission reductions and the types of programs states are targeting.

EPA Guidance

Title/Description	URL Address
Guidance on State Implementation Plan (SIP) Credits for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures. EPA Office of Air and Radiation, August 2004. In this document, EPA provides detailed information on quantifying emission reductions from electric-sector programs.	http://www.epa.gov/ttn/oarpg/t1/meta/m25362.html
Incorporating Emerging and Voluntary Measures in a State Implementation Plan. EPA Office of Air and Radiation, September 2004. In this guidance document, EPA lays out a basic methodology for approving nontraditional measures in a SIP through notice-and-comment rulemaking.	http://www.epa.gov/ttn/caaa/t1/meta/m8507.html
Integration Pilots: Improving Air Quality through Energy Efficiency & Renewable Energy Technologies. EPA Concept Paper, August 26, 2004. This paper describes a DOE/EPA initiative pilot initiative demonstrating how states can use energy efficiency and renewable energy technologies to improve air quality while addressing energy goals.	http://www.eere.energy.gov/regions/mid-atlantic/cleanenergy_pres.html
Incorporating Bundled Emissions Reduction Measures in a State Implementation Plan. August 2005. This guidance document describes how states can identify individual voluntary and emerging measures and "bundle" them in a single SIP submission. For SIP evaluation purposes, EPA considers the performance of the entire bundle (the sum of the emission reductions from all the measures in the bundle), not the effectiveness of any individual measure.	http://www.epa.gov/ttn/oarpg/t1/meta/m10885.html

Information About States

Title/Description	URL Address
Comparison of Methods for Estimating the NO_x Emission Impacts of Energy Efficiency and Renewable Energy Projects: Shreveport, Louisiana Case Study. Chambers, A. et. al. NREL, revised July 2005, NREL/TP-710-37721. This report describes three methods for estimating emission reductions from electric-sector programs and provides a quantitative comparison of the methods.	http://www.nrel.gov/docs/fy05osti/37721.pdf
Estimating Seasonal and Peak Environmental Emission Factors—Final Report. Prepared by PA Governmental Services for the Wisconsin DOA, May 2004. This report summarizes work done in Wisconsin to evaluate the air emissions avoided by energy efficiency programs.	http://www.doa.state.wi.us/docs_view2.asp?docid=2404
Prospective Environmental Report for Clipper Wind Power. Prepared by the Resource Systems Group, Inc. for Clipper Wind Power under contract with Environmental Resources Trust, April 2003. This report quantifies the air emissions reduced by the operation of a wind plant located in the Mid-Atlantic United States.	http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/wpa/sips_model.pdf
Renewable Energy and Energy Efficiency as Pollution Prevention Strategies for Regional Haze. Prepared by the air pollution prevention forum for the Western Regional Air Partnership, April 2003. This report summarizes the renewable energy and energy efficiency goals adopted in several western states and projects the emission reductions that would result from the attainment of the goals.	http://www.wrapair.org/forums/ap2/documents/WRAP_AP2_Policy.doc

General Articles About Quantifying Emission Reductions

Title/Description	URL Address
2003 NEPOOL Marginal Emission Rate Analysis. Prepared for the NEPOOL Environmental Planning Committee, December 2004. ISO New England performs system modeling each year to estimate system marginal emission rates.	http://www.iso-ne.com/genrtion_resrcs/reports/emission/index.html
Emerging Tools for Assessing Air Pollutant Emission Reductions from Energy Efficiency and Clean Energy. Global Environment & Technology Foundation, January 31, 2005. This report presents a comparison of emission modeling tools that are currently under development.	http://www.4cleanair.org/EmissionsModelingPhaseIIFinal.pdf
Estimating Carbon Emissions Avoided by Electricity Generation and Efficiency Projects: A Standardized Method (MAGPWR). LBNL, LBNL-46063, September 1999. This report describes a spreadsheet model developed for estimating emission reductions from electric-sector programs.	http://eetd.lbl.gov/EA/EMS/reports/46063.pdf
Methods for Estimating Emissions Avoided by Renewable Energy and Energy Efficiency. Prepared for EPA's State and Local Capacity Building Branch, available in July 2005. This paper assesses quantification methods based on dispatch analysis and historical emissions and provides a quantitative comparison of the two approaches.	http://www.synapse-energy.com
National Assessment of Emissions Reduction of Photovoltaic Power Systems. Prepared for EPA's Air Pollution Prevention and Control Division by Connors, S. et al. This paper lays out a method of estimating emissions avoided by small PV systems based on the analysis of historical emissions data.	http://esd.mit.edu/symposium/pdfs/papers/connors.pdf (provides information about this article)

Tools and Analyses

Title/Description	URL Address
Clean Air and Climate Protection Software (CACPS). The State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) have developed a software tool designed for use in creating emission reduction plans targeting greenhouse gas emissions and air pollution.	http://www.4cleanair.org/InnovationDetails.asp?innoid=1
ECalc. The eCalc tool was developed to assess emission reductions from energy efficiency in Texas.	http://ecalc.tamu.edu/
Energy Efficiency/Renewable Energy Impact In The Texas Emissions Reduction Plan (TERP). The Energy Systems Lab conducts this annual report of the energy savings and NO_x reductions resulting from the statewide adoption of the Texas Building Energy Performance Standards and from energy code compliance in new residential construction in 41 Texas counties.	Summary (Volume I): http://energysystems.tamu.edu/sb5/documents/tceq-report-2-14-2005-vol-I.pdf Technical (Volume 2): http://energysystems.tamu.edu/sb5/documents/tceq-report-2-14-2005-Vol-II.pdf Appendix (Volume 3): http://energysystems.tamu.edu/sb5/documents/tceq-report-2-14-2005-III.pdf
OTC Emission Reduction Workbook 2.1, November 12, 2002. The OTC developed a spreadsheet tool, based on system dispatch modeling, for assessing emission reductions from EE/RE in the northeastern United States.	http://www.otcair.org/document.asp?fview=Report Excel File: http://www.otcair.org/download.asp?FID=68&Fcat=Documents&Fview=Reports&Ffile=OTC%20Workbook%20version%202.1.xls Description and User's Manual: http://www.otcair.org/download.asp?FID=69&Fcat=Documents&Fview=Reports&Ffile=Workbook%202.1%20Manual.pdf
Power System Dispatch Models. Models that can be used to assess displaced emissions include: • GE MAPPS (GE Strategic Energy Consulting) • IPM (ICF Consulting) • NEMS (U.S. Energy Information Administration) • PROSYM (Global Energy Decisions)	MAPPS: http://www.mapps.l-3com.com/L3_MAPPS/Products_and_Services/Power_Systems_and_Simulation/Power_Solutions/ppsim.shtml IPM: http://www.icfconsulting.com/Markets/Energy/energy-modeling.asp#2 NEMS: http://www.eia.doe.gov/oiaf/aeo/overview/index.html PROSYM: http://www.globalenergy.com/pi-market-analytics.asp

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Title/Description	URL Address
APPF. 2002. Final Draft Report on Energy Efficiency and Renewable Energy. Prepared by the Air Pollution Prevention Forum for WRAP. December.	http://www.wrapair.org/forums/ap2/documents/draft/Final_Draft_Report-AP2EE-RE.pdf
Chambers, A., D.M. Kline, L. Vimmerstedt, A. Diem, D. Dismukes, and D. Mesyanzhinov. 2005. Comparison of Methods for Estimating the NO_x Emission Impacts of Energy Efficiency and Renewable Energy Projects: Shreveport, Louisiana Case Study. NREL/TP-710-37721. Revised July 2005. NREL.	http://www.nrel.gov/docs/fy05osti/37721.pdf
EPA. 2004. Incorporating Emerging and Voluntary Measures in a State Implementation Plan. EPA's Office of Air and Radiation. September.	http://www.epa.gov/ttn/caaa/t1/meta/m8507.html
EPA. 2005. eGRID-Emissions and Generation Resource Integrated Database Web site. Accessed July 2005.	http://www.epa.gov/cleanenergy/egrid/index.htm
Erickson, J., C. Best, D. Sumi, B. Ward, B. Zent, and K. Hausker. 2004. Estimating Seasonal and Peak Environmental Emission Factors—Final Report. Prepared by PA Governmental Services for the Wisconsin DOA. May 21.	http://www.doa.state.wi.us/docs_view2.asp?docid=2404
GETF. 2002. Southwestern Connecticut Clean Demand Response Pilot Project, Phase I Report. Prepared for the OTC by the Global Environment & Technology Foundation. November.	http://www.opm.state.ct.us/swct/SWCTPhase1-Report-Final.pdf
Haberl, J., C. Culp, B. Yazdani, T. Fitzpatrick, J. Bryant, and D. Turner. 2003. Energy Efficiency/Renewable Energy Impact in the Texas Emissions Reduction Plan (TERP), Volume I—Summary Report. Annual Report to TCEQ, September 2003–August 2004. ESL-TR-04/12-01. ESL.	http://energysystems.tamu.edu/sb5/documents/tceq-report-2-14-2005-vol-I.pdf
ISO New England. 2004. 2003 NEPOOL Marginal Emission Rate Analysis. Prepared for the NEPOOL Environmental Planning Committee. December.	http://www.iso-ne.com/genrtion_resrcs/reports/emission/index.html
Keith, G. 2005. Methods for Estimating Emissions Avoided by Renewable Energy and Energy Efficiency. Prepared for EPA's State and Local Programs. Capacity Building Branch. July 14.	http://dep.state.ct.us/air2/siprac/2005/emissionreduction.pdf
Keith, G., D. White, and B. Biewald. 2002. The OTC Emission Reduction Workbook 2.1: Description and Users' Manual. Volume 2.1. Prepared for the OTC by Synapse Energy Economics, Inc. November 12.	http://www.otcair.org/download.asp?FID=69&Fcat=Documents&Fview=Reports&Ffile=Workbook%202.1%20Manual.pdf
MWCOG. 2004. Plan to Improve Air Quality in the Washington, D.C-MD-VA Region. Appendix J. Metropolitan Washington Air Quality Committee. February 9.	http://www.mwcog.org/uploads/committee-documents/yFZaVg20040217142920.pdf.
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OTC. 2002. Emission Reduction Workbook 2.1, November 12, 2002. OTC. November 12.	http://www.otcair.org/document.asp?fview=Report
Synapse Energy Economics. Date unknown. Unpublished emissions data, Synapse Energy Economics, Inc., Cambridge, MA.	N.A.
WRAP. 2003. Renewable Energy and Energy Efficiency as Pollution Prevention Strategies for Regional Haze. Prepared by the Air Pollution Prevention Forum for WRAP. April.	http://www.wrapair.org/forums/ap2/docs.html

3.4 Funding and Incentives

Policy Description and Objective

Summary

States are achieving significant energy and cost savings through well-designed, targeted funding and incentives for clean energy technologies and services. Key types of financial incentives programs states offer include:

- Loans
- Tax incentives
- Grants, buy-downs, and generation incentives
- Nitrogen oxide (NO_x) set-asides
- Energy performance contracting
- Supplemental Environmental Projects (SEPs)

States have achieved additional savings by coordinating financial incentives with other state programs and by leveraging utility-based clean energy programs.

Over the past three decades, states have diversified their programs from grants or loans into a broader set of programs targeted at specific markets and customer groups. This diversification has led to portfolios of programs with greater sectoral coverage, a wider array of partnerships with businesses and community groups, and an overall reduced risk associated with programmatic investments in energy efficiency and clean supply options.

Objective

State-provided funding and incentives meet the public purpose objectives of supporting technologies and products that are new to the market and encouraging and stimulating private sector investment. Funding and incentives can also reduce market barriers by subsidizing higher "first costs," increasing consumer awareness (the programs are often accompanied by education campaigns and the active promotion of products to help achieve a state's energy efficiency goals), and encourage or "jump-start" private sector investment.

States have developed a range of targeted funding and incentives strategies that are bringing clean energy to the marketplace, including loans, tax incentives, grants, buy-downs, performance contracting, set-asides for energy efficiency/renewable energy (EE/RE), and supplemental environmental projects (SEPs). These programs help governments, businesses, and consumers invest in a lower cost, cleaner energy system.

Benefits

States provide funding and incentives through a combination of sources (i.e., state and federal funds, utility programs, and ratepayers), to support a broad range of cost-effective clean energy technologies, including energy efficiency, renewable energy, and combined heat and power (CHP). State funding and incentive programs, some of which are self-sustaining (e.g., revolving loan funds), deliver energy and cost savings for governments, businesses, and consumers. Program results vary depending on the configuration of funding and incentives used by each state. In Texas, the revolving loan fund has resulted in $152 million in savings since 1989 on an investment of $123 million (DOE 2005). In Oregon, more than 12,000 tax credits worth $243 million have been issued since 1980, which save or generate energy worth about $215 million per year (Oregon DOE 2005b).

Providing funding and incentives for clean energy can offer the following environmental, energy, and economic benefits:

- Reduces energy costs by supporting cost-effective energy efficiency improvements and onsite generation projects.
- Ensures that clean energy is delivered, specifies which technologies are used, and offers incentives to install technologies. Providing funding and incentives also accelerates the adoption of clean energy technologies by improving the project economics and offsets market, institutional, or regulatory barriers until those barriers can be removed.

- Establishes a clean energy technology or project development infrastructure to continue stimulating the market after the incentives are no longer in effect.
- Leverages federal incentives and stimulates private sector investment by further improving the economic attractiveness of clean energy. A small investment may lead to broad support and adoption of a clean energy technology or process.
- Stimulates clean energy businesses and job creation within the state.
- Supports environmental protection objectives, such as improving air quality.

States with Funding and Incentive Programs

States offer a diverse portfolio of financing and incentive approaches that are designed to address specific financing challenges and barriers and help specific markets and customer groups invest in clean energy. These programs include:

- Revolving loan funds
- Energy performance contracting
- Tax incentives
- Grants, rebates, and generation incentives
- NO_x set-asides for energy efficiency and renewable energy projects
- SEPs

Revolving Loan Funds

Revolving loan funds provide low-interest loans for energy efficiency improvements, renewable energy, and distributed generation (DG). Seven states currently operate a total of seven revolving loan programs that support energy efficiency, and 25 states have a total of 51 loan programs (including programs administered by the state, local government agencies, and utilities) that support clean generation (DSIRE 2005a, DSIRE 2006).

Texas LoanSTAR Program

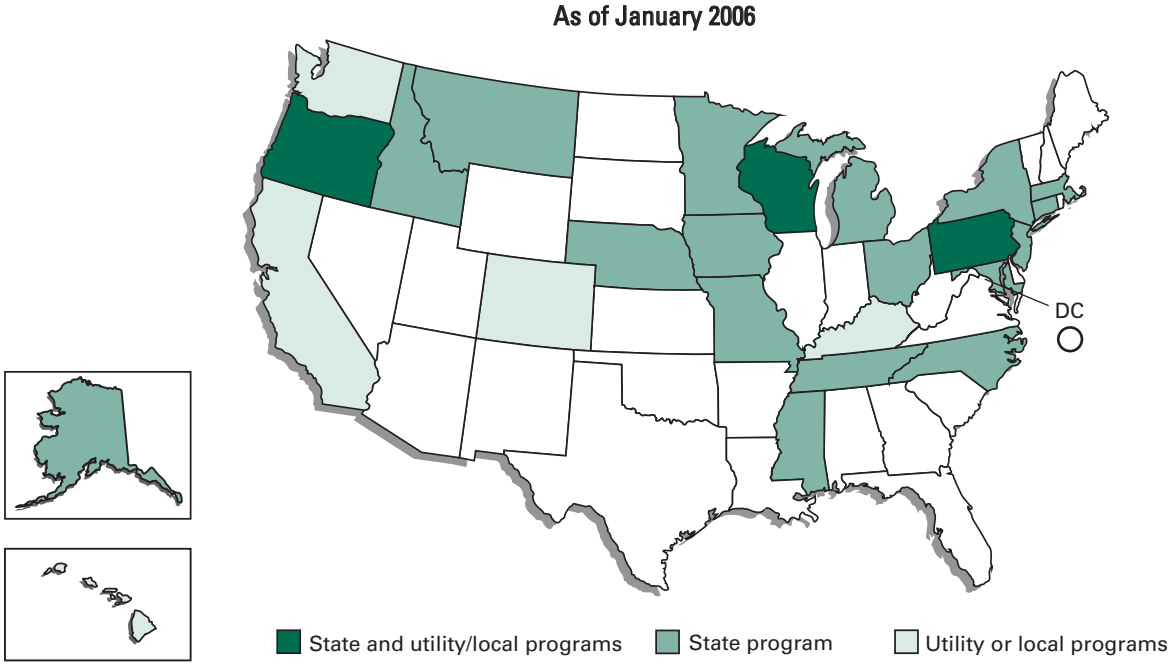
The Texas LoanSTAR program is designed to provide low-interest loans to finance energy conservation retrofits in state public facilities. Loans are repaid in four years or less, depending on expected energy savings. Loans are often repaid using cost savings from reduced energy costs. Energy savings are verified by benchmarked energy use before retrofits are installed, followed by monthly energy use analysis for each building.

The funds are designed to be self-supporting. States create a pool of capital when the program is launched. This capital then "revolves" over a multi-year period, as payments from borrowers are returned to the capital pool and are subsequently lent anew to other borrowers. Revolving funds can grow in size over time, depending on the interest rate that is used for repayment and the administrative costs of the program.

Revolving loan funds can be created from several sources, including public benefits funds (PBFs), utility program funds, state general revenues, or federal funding sources. The largest state energy efficiency revolving fund, the Texas LoanSTAR program, provides loans for energy efficiency projects in state public facilities. The fund is based on a one-time capital investment of $98 million from federal oil overcharge restitution funds and is funded at a minimum of $95 million annually. Loan funds are typically created by state legislatures and administered by state energy offices.

States have used revolving funds primarily for efficiency investments in publicly owned buildings or for facilities with a clear public purpose that are appropriate for any type of borrower. To contribute to state energy goals and be self-sustaining, states establish revolving funds that are either well-capitalized (e.g., large enough to meet a significant portion of the market need) or long-term (e.g., to allow funds to fully recycle and be re-loaned to a sizable number of borrowers). Ideally, revolving loan

Figure 3.4.1: States with Revolving Loan Funds for Renewable Energy



Source: DSIRE 2006a.

funds are both well-capitalized and long-term; however, it can be difficult to assemble the large pool of capital required to achieve both of these elements. In order to maintain a large pool of capital, it is important for states to consider several tradeoffs, including, for example, determining the balance between private and public sector loans, and between short-term and long-term loans. Additionally, if a fund holds only a few loans made to very similar types of commercial and industrial borrowers, it may be highly exposed to default; a fund with many diverse loans spreads the risks.

Energy Performance Contracting

Energy performance contracting allows the public sector to contract with private energy service companies (ESCOs) to provide building owners with energy-related efficiency improvements that are guaranteed to save more than they will cost over the course of the contracting period. ESCOs provide energy auditing, engineering design, general contracting, and installation services. They help arrange project financing and guarantee that the savings will be sufficient to pay for the project, where necessary, over the financing term (EPA 2004). (See Section 3.1, *Lead by Example,* for more information.) The contracts are privately funded and do not involve state funding or financial incentives. They have been used extensively by federal, state, and local facilities to reduce utility and operating costs and to help meet environmental and energy efficiency goals. These energy efficiency improvement projects can include the use of CHP. Twenty states have implemented performance contracting activities (ESC 2005), primarily through legislation. With the help of ESCOs, which provide energy efficiency expertise for project implementation, many facilities have experienced energy savings of 10% to 40% or more.

Tax Incentives

State tax incentives for energy efficiency, renewable energy, and CHP take the form of personal or corporate income tax credits, tax reductions or exemptions (e.g., sales tax exemptions on energy-efficient appliances, such as the sales tax holidays offered by some states), and tax deductions (e.g., for construction programs). Tax incentives aim to spur innovation by the private sector by developing more energyefficient technologies and practices and increasing consumer choice of energy-efficient products and services (Brown et al. 2002). Thirty-eight states currently have tax incentive programs for renewable energy (DSIRE 2005a).

State tax incentives for renewable energy are a fairly common policy tool. While state tax incentives tend to be smaller in magnitude than federal tax incentives, they are often additive and can become significant considerations when making purchase and investment decisions. The most common types of state tax incentives are (1) credits on personal or corporate income tax, and (2) exemptions from sales tax, excise tax, and property tax. In addition, some states have established production tax credits. For example, New Mexico offers a $0.01 per kilowatt-hour (kWh) production tax credit for solar, wind, and biomass that can be taken along with the federal Production Tax Credit (PTC). Because different tax incentives are suitable to different taxpayers' circumstances, states may want to consider using a range of tax incentives to match these circumstances. For example, property tax exemptions might be more attractive for large wind projects, while homeowners might prefer to claim an income tax credit for the purchase of a solar photovoltaic (PV) system.

Several states provide tax incentives for CHP, including Connecticut, Idaho, Iowa, Nevada, New Mexico, North Carolina, Oregon, South Dakota, and Utah. The majority of these states also provide property tax credits that apply to renewable energy and CHP systems (e.g., Connecticut, Iowa, Nevada, North Carolina, Oregon, and South Dakota). Idaho offers a sales tax rebate on CHP equipment. New Mexico and Utah offer income tax credits for energy production from CHP systems. Iowa, Nevada, New Mexico, and North Carolina limit their tax incentives to biomass projects, while the other states allow a broader range of CHP system designs (EPA 2005b).

States also offer tax incentives for energy efficiency investment. These incentives are typically offered as state income tax credits or deductions, but can also be structured as exemptions from state sales taxes on appliances or titling taxes on vehicles. The most active state in terms of tax incentives is Oregon, which maintains a set of business and residential tax incentives for energy efficiency measures. Other states with tax incentives for energy efficiency investment include Maryland, Indiana, Minnesota, New York, and Hawaii. (See the *State Examples* section on page 3-79 for more information.)

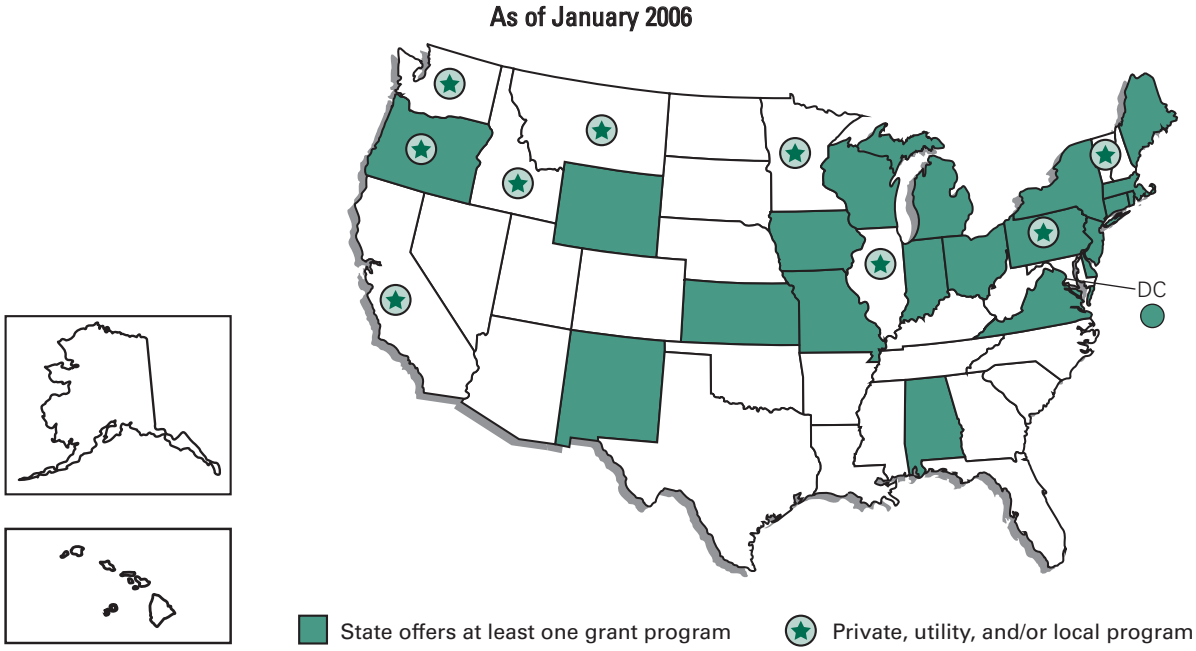
Oregon Tax Incentives

The Oregon Department of Energy offers the *Business Energy Tax Credit (BETC)* and *Residential Energy Tax Credit (RETC)* to Oregon businesses and residents that invest in qualifying energy-efficient appliances and equipment, recycling, renewable energy resources, sustainable buildings, and transportation (e.g., alternative fuels and hybrid vehicles). Through 2004, more than 12,000 Oregon energy tax credits worth $243 million have been awarded. All together, those investments save or generate energy worth about $215 million a year (Oregon DOE 2005a).

Grants, Buy-Downs, and Generation Incentives

Grants, buy-downs, and generation incentives provide funding and incentives for developing energy efficiency and clean generation technologies. Typically, states promote energy efficiency measures through buy-downs (also known as rebates), and support clean generation through both buy-downs and generation incentives. Although a major source of funding for efficiency activities comes from PBFs, states also fund these activities through alternative sources including direct grants, and rebates and generation incentives provided by utilities. States administer their own funding and incentives programs designed to leverage utility programs and promote

Figure 3.4.2: States with Grant Programs for Renewable Energy



Source: DSIRE 2006b.

additional private sector investment. (For information about grants, buy-downs, and generation incentives funded through PBFs, see Section 4.2, *Public Benefits Funds for Energy Efficiency* and Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs.*)

Grants. With respect to renewable energy, state grants cover a broad range of activities and frequently address issues beyond system installation costs. To stimulate market activity, state grants cover research and development, business and infrastructure development, system demonstration, feasibility studies, and system rebates. Grants can be given alone or leveraged by requiring recipients to match the grant or to repay it. Grants can also be bundled with other incentives, such as low-interest loans. Grant programs promoting renewable energy technologies are administered by states, nonprofit organizations, and/or private utilities in 28 states (DSIRE 2005a).

State-appointed agencies are also finding ways to use limited funding for grants. For example:

- Massachusetts uses grant funding to stimulate residential green power purchases. For every dollar a residential green power purchaser spends on the incremental cost of green power, the state grants up to $1 to the resident's local government for use in renewable energy projects and up to $1 for renewable energy projects that serve low-income residents throughout the state. Renewable energy grants can range from tens of thousands to millions of dollars. In New Jersey, for example, the Renewable Energy and Economic Development program is funded at $5 million, from which it provides grants ranging from $50,000 to $500,000 for market development activities.
- Pennsylvania's Energy Harvest program provides $5 million annually for clean and renewable energy projects. Since its inception in May 2003, the Pennsylvania Energy Harvest Grant Program has awarded $15.9 million for 34 advanced or renewable energy projects, and leveraged another $43.7 million in private funds (PA DEP 2005). The 34 Energy Harvest projects will produce or conserve

the equivalent of 37,800 megawatts per hour a year (enough to power 5,000 homes) and will avoid 85,000 pounds of nitrogen oxide (NO_x), 131,000 pounds of sulfur dioxide (SO_2), 2,700 pounds of carbon monoxide (CO), and 10 million pounds of carbon dioxide (CO_2) (PA DEP 2005).

Many programs also include grants for energy efficiency investment (and in some cases in-kind contributions such as direct installation of equipment or trade-in programs). Typically, the consumer does not directly invest in these programs. In California, the city of San Francisco's Peak Energy Program (SFPEP) provides funding for torchiere trade-in programs, multi-family direct installation of hard-wired compact fluorescent lighting (CFL) fixtures, and free replacement of refrigerator gaskets at grocery stores. Some states award financial grants directly. For example, the Oregon Energy Trust provides incentives of up to $10,000 for homeowners and $35,000 for businesses for the purchase of rooftop PV systems.

Rebates (Buy-Downs). Rebates, also called buy-downs, are provided by the state to the end user and are a common form of state financial incentive. Typically, rebates are funded by utility customers and administered by utilities, state agencies, or other parties, with oversight from public utility commissions (PUCs) or other state agencies.[7] Many states support their rebate programs through PBFs (see Section 4.2, *Public Benefits Funds for Energy Efficiency* and Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs*).

Rebate levels vary by technology and state. Twenty-two states administer renewable energy rebate programs or have utility- or locally administered rebate programs in the state (DSIRE 2005b). In addition to rebates for renewable energy, states also offer rebates for a wide range of energy efficiency measures, including lighting, refrigeration, air conditioning, agricultural, and gas technologies. About 20 states conduct energy efficiency programs, and most of these states offer rebates or similar kinds of incentives.

States frequently provide rebates for solar PV, but rebates are also provided for other technologies, such as wind, biomass, and solar thermal hot water. In general, rebates are provided on a per-watt basis, with the total rebate amount expressed either as maximum dollar amount or a maximum percentage of total system cost. In New York, the New York State Energy Research and Development Authority (NYSERDA) provides a $4.00 to $4.50 per watt rebate for solar PV and will cover up to 60% of the system's total installed cost. In California, the Emerging Renewables Program provides rebates for systems up to 30 kilowatts (kW). Rebates are $2.80 per watt for PV systems and $3.20 per watt for solar thermal and fuel cells. For wind systems, rebates are $1.70 per watt for the first 7.5 kW with $0.70 per watt thereafter. Rebates are provided only for equipment that is certified by the state (CEC 2005a).

Nevada offers a rebate program of $3 per watt (2006 program year) for grid-connected PV installations on residences, small businesses, public buildings, and schools. Nevada's utilities, Nevada Power and Sierra Pacific Power, administer the rebate program. The renewable energy credits (RECs) produced by their customers' PV systems count towards the utilities' solar goals under Nevada's renewable portfolio standards (RPS) (DSIRE 2005b).

States have coordinated their rebate programs with those offered by municipal utilities, governments, and others. For example, in California, rebate programs administered by investor-owned utilities (IOUs) are often tied directly to the values contained in the Database for Energy Efficient Resources (DEER) Measure Cost Database. This database provides statistically averaged cost differentials between baseline equipment and the energy efficiency measure designed to replace it (for example, T-8 fluorescent lamps with electronic ballasts vs. T-12 lamps with magnetic ballasts). The incremental energy savings of each measure in the database is also provided (CEC 2005b). These data provide program planners with the necessary information to forecast energy savings

[7] A database of state utility sector efficiency programs can be found at: http://aceee.org/new/eedb.htm.

Massachusetts Provides Grants and Rebates for Renewable Energy

The Massachusetts Technology Collaborative (MTC) administers grants and rebates in Massachusetts. With approximately $25 million per year, the MTC manages programs that target a broad range of recipients. Eligible technologies include wind energy, fuel cells, hydroelectric, PV, landfill gas, and low emission advanced biomass power. The project site must be a customer of one of the investor-owned utilities in Massachusetts. In addition, it must be grid-connected and use 50% of the power on site. Programs include the following:

- *The Small Renewable Energy Rebate Program* provides rebates for PV, wind, and micro-hydro systems. Rebate levels vary by technology and system size.
- *The Green Building and Infrastructure Program* provides grants to support the installation of clean energy, particularly solar PV, in buildings such as schools. Initial grants of $25,000 are provided for studies, followed by up to $500,000 grants for system installation.
- *The Clean Energy Choice Program* provides tax incentives for customers' green power purchases and provides matching grants that benefit consumers' communities and low-income residents.
- *The Industry Support Program* makes direct investments to catalyze new product commercialization, works to build networks and provide services that better enable companies to access capital and other vital resources, and strives to lower barriers to success for entrepreneurs in the state.

of planned efficiency efforts, depending on market penetration levels. This helps provide stability and predictability in rebate programs, helping to create conditions for long-term market development and growth. However, in order to encourage and institutionalize renewable energy technologies and energy-efficient equipment and to provide industry with the stability required for market transformation, it is important for states to institute a gradual and predictable reduction in rebates over time.

In addition to rebates for renewable energy, states also offer rebates for a wide range of energy efficiency measures, including lighting, refrigeration, air conditioning, agricultural, and gas technologies. About 20 states conduct energy efficiency programs, and most of these states offer rebates or similar kinds of incentives. Typically, these rebates are funded by utility customers and administered by utilities, state agencies, or other parties, with oversight from PUCs or other state agencies. In most cases, utility bill charges are placed in a PBF; in a few states, programs are funded by utilities directly under utility commission directives. For example, Minnesota's Conservation Improvement Program (CIP), is funded by the state's utilities. (A database of state utility-sector efficiency programs can be found at: http://aceee.org/new/eedb.htm.)

Generation Incentives. In contrast to incentives that help finance initial capital costs (e.g., rebates and sales tax exemptions), states provide generation incentives on the basis of actual electricity generated. In their most straightforward form, generation incentives are paid on a per kWh basis. For example, in 2005, California began a pilot performance-based incentive (PBI) that provides incentive payments of $0.50/kWh over the first three years of PV system operation. The rebate is based on the actual electricity generated by PV systems. System performance is measured using a revenue-quality meter. Participants report their system performance either through their utility or a Web-based, third-party reporting provider. The total dollar amount reserved for a system is based on the array capacity, PTC rating, and a 25% capacity factor. This reserve amount is likely to be higher than actual system performance, but any power generated above the actual amount will not be paid. In Pennsylvania, the Energy Cooperative, a nonprofit organization that is licensed as an electricity supplier by the Pennsylvania PUC, offers a Solar Energy Buy-Back program that pays its 6,500 members with 1 kW to 5 kW PV systems $0.20/kWh for the output of their systems. The program purchased 70,740 kWh in 2004 (Energy Cooperative 2005).

NO_x Set-Asides for Energy Efficiency and Renewable Energy Projects

Under the NO_x Budget Trading Program in effect as of 2003 (Clean Air Act 1990 Part 96), 22 eastern states and Washington, D.C. allocate NO_x allowances to large electric generating and industrial combustion units within state budgets. States may reserve allowances from the budget to address new units or to provide incentives for certain activities.

States can use one type of incentive, an EE/RE set-aside, to award NO_x allowances for EE/RE and CHP projects. The allowances provide a financial incentive for projects that reduce energy demand or increase the supply of clean energy. To date, six states (Indiana, Maryland, Massachusetts, New Jersey, New York, and Ohio) have developed an EE/RE set-aside program, and Missouri has proposed a set-aside program. Thus, about one-third of the 22 affected states have elected to include an EE/RE incentive program. The size of the set-aside in each state ranges from 454 tons (Ohio) to 1,241 tons (New York) and from 1% to 5% of each state's NO_x trading program budget (EPA 2005c).

Each state determines the projects that are eligible for allowance awards. Typical projects include:

- Installation of a new CHP system project (provided allowances have not already been distributed to the project from the new source set-aside).
- Renewable energy projects, including wind, solar, biomass, and landfill methane.
- Demand-side management actions either within or outside the source's facility (EPA 2005d).

As in the NO_x budget trading program, states have the flexibility to include a NO_x set-aside for EE/RE as part of their NO_x allocation approach for the Clean Air Interstate Rule (CAIR) (EPA 2005e). CAIR establishes a cap and trade system for SO_2 and NO_x in 28 states and Washington, D.C. Under CAIR, states may craft their allocation approach to meet their state-specific policy goals (EPA 2005e).

Supplemental Environmental Projects

An SEP is an environmentally beneficial project implemented through an environmental enforcement settlement. Under a settlement, a violator voluntarily agrees to undertake an SEP as a way to offset a portion of its monetary penalty. SEPs are commonly implemented through both federal and state enforcement actions. State SEPs can be a significant source of funding for new clean energy projects. There are many opportunities for states to implement clean energy SEPs through large and small enforcement settlements. Knowing the flexibility of a state's SEP policy (which may be different from EPA's SEP policy), making SEPs a routine part of the enforcement settlement process, and being aware of the opportunities for clean energy projects as SEPs are key ingredients for successfully increasing the number of clean energy projects funded through state SEPs. Depending on state and local needs, SEPs can involve the violator's facilities or can be a project that provides local benefits. For example, in response to a violation of air quality standards, a Colorado manufacturer agreed to fund an energy efficiency assessment at its facility and implement some of the assessment recommendations. In Maryland, in response to a violation of visible emissions standards, a utility installed PV systems on three public buildings in the county.

EPA's SEP toolkit provides information for state and local governments on undertaking energy efficiency and renewable energy projects. The toolkit includes information on general SEP requirements at federal and state levels, potential benefits from EE/RE SEPs, project examples, and general implementation guidance (EPA 2005a). (The toolkit is available at: http://www.epa.gov/cleanenergy/pdf/sep_toolkit.pdf.)

Designing Effective Funding and Incentive Programs

When developing and implementing effective funding and incentive programs, states consider a variety of key issues including design principles, identifying key participants, assessing the level of funding, and determining program timing and duration. It is also important to consider interactions with federal and state policies and opportunities to coordinate and leverage programs.

Design Principles

States have developed extensive experience in funding and incentives programs. While program design considerations are somewhat specific to the markets and technologies involved, four general design principles have emerged:

- Develop specific target markets and technologies based on technical and economic analyses of clean energy markets and technologies.
- Use financing and incentives as part of a broader package of services designed to encourage investments.
- Establish specific technical and financial criteria for clean energy investments.
- Track details of program participation, costs, and energy savings and production to enable evaluation and improvement.

In designing their funding programs, states assess their intended markets and other funding sources, particularly the competitive commercial financing options that are available to their target customers. State programs have been most successful when they target markets that currently receive little or no attention from the commercial financing industry, rather than competing with these private offerings. Alternatively, states can seek to augment the incentives offered through private financing by working with the financial industry to design effective programs that address market barriers other than lack of capital alone.

States have found that coordinating funding and incentives with other program policies results in more effective programs and creates opportunities to leverage investments. For example, New Jersey offers a package of financial incentives, combined with its RPS and an REC program, which has reduced the payback period for solar home systems to less than five years (New Jersey 2005). Other program features that states bundle with financing and incentives include customer education and outreach, standardized and streamlined interconnection and permitting processes for clean energy production, and creation of effective partnerships with financial institutions, equipment providers, and installers.

Participants

Participants include both public and private sector organizations. Public sector participants include state and local government agencies, school districts, and nonprofit organizations. Private sector participants include large corporations, small businesses, and individual residents. Depending on a state's energy-efficiency goals, budgets, and general policy acceptance, certain stakeholders might be targeted more directly than others during the initial policy rollout phase or over the entire life of the program.

Participants in funding and incentives programs and their typical roles and responsibilities include:

- *State Legislatures.* State legislatures pass bonds, authorize appropriations, and authorize incentives. They also authorize changes to state tax laws and state accounting and procurement rules that enable clean energy funding programs. State legislatures or executive branches can give authority to outsource or conduct performance contracting in any facilities under their fiscal authority.
- *State Energy Offices and PUCs.* Energy offices and PUCs administer financing programs, provide technical assistance, and measure and evaluate state-funded projects to ensure that intended results are being achieved.
- *Utilities.* Utilities administer related programs that states and energy customers can leverage, such as rebates and buy-downs.
- *Third Parties.* Third parties such as nonprofit organizations serve as financing centers to manage

funds (e.g., the Iowa Energy Investment Corporation) and can also serve as "trade allies" (e.g., equipment installers and ESCOs) and lending institutions.

- *Businesses.* Businesses apply for funding and incentives and purchase and/or use clean energy technologies.
- *Residents and Other Consumers.* Consumers apply for funding and incentives and purchase and/or use clean energy technologies.

Funding

State clean energy programs that offer financing or financial incentives have used a wide range of funding sources, including:

- *Utility Budgets.* In states that have established utility incentives for demand-side resources, utilities provide funding support for clean energy as part of their responsibility to deliver least-cost reliable service to their customers. Utilities can fund these resources in different ways, such as within their resource planning budgets or as a percent of total revenues, as directed by state policy.
- *Petroleum Violation Escrow (PVE) Funds.* Legal settlements stemming from 1970s-era oil pricing regulation violations generated billions of dollars, which states used primarily during the 1980s and 1990s for clean energy programs.
- *PBFs.* These are typically funded by small charges on utility customer bills (see Section 4.2, *Public Benefits Funds for Energy Efficiency* and Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs*).
- *Annual Appropriations.* Some states support energy financing and incentive programs with general state revenues appropriated through the annual budget process.
- *Bonds.* States have used their bond issuance authority to raise capital for lending programs. In some cases, loan repayments are applied to bond debt service.
- *Environmental Enforcements and Fines.* States that collect fines and penalties from environmental enforcement actions can use the proceeds to support clean energy financing and incentives. Alternatively, funds can come directly from a violator, through a supplemental environmental project.
- *CO_2 Offset Programs. S*tates have used their CO_2 offset programs as a source of funding. For example, Oregon's 1997 state law HB 3283 required new power plants in the state to offset approximately 17% of their CO_2 emissions. Power plants can do this directly or by paying the Oregon Climate Trust, which uses the funds to support offset projects, including sequestration, renewable energy projects, and energy efficiency projects. The program currently does not recognize CHP as an efficiency technology either in calculating the required offsets or in the generation of offsets. Washington and Massachusetts have similar offset funding programs.

Funding Levels

When designing financing and incentive programs, states have found that it is important to determine the financing limits and incentive levels that are appropriate to market conditions. Ideally, incentives provide just enough inducement to generate significant new market activity and limit financial risk.

For loans or other credit-related incentives such as loan guarantees, public financing typically pays for just enough of the project cost to motivate private investment. If public financing covers too much of a project, it can promote projects that are not financially sound. It is believed that if investors invest a significant amount of their own money in the project, they will be motivated to make it succeed. Another method is to buy down the interest rates. This is often attractive to both businesses and homeowners. While different than loan guarantees, buydowns can help put monthly payments within budgetary reach.

For financial incentives such as grants or rebates, the amount offered is often set at a level just large enough to induce private investment. Incentives that are too high can distort market behavior so that the technology does not sustain market share after the incentives end.

Timing and Duration

Another key consideration when developing funding and incentives programs is determining how long the program will be in effect and whether funding will be available on a consistent year-to-year basis. State incentive and funding programs have been more effective when they have been sustained and consistent over time (e.g., the Texas LoanSTAR program) (Prindle 2005). Several years are typically required for a significant effort to become known and accepted in the marketplace. States with effective programs typically have established five- to 10-year authorizations for their programs. In some markets, especially where projects require long lead times for design, permitting, construction, and underwriting, program cycles may be longer. In other cases—for example, in Oregon where faster-turnover consumer products are involved—programs can be conducted on a shorter time frame. Programs involving incentives, loans, or other forms of financial assistance that have been offered on a short-term basis have failed to allow time for markets to respond (Prindle 2005).

The appropriate duration of an incentive or financing program also depends on the characteristics of the target market and the goals of the program. A revolving loan program can continue indefinitely, since the fund typically requires a single initial capitalization. If the size of the target market is large relative to the size of the fund principal, the program can run productively for many years. In other cases, an incentive effort might be targeted at acquiring a specific level of resources in a given time frame; in such cases, funding levels would tend to be higher and the program duration shorter. Incentives are gradually reduced and ultimately eliminated when the technology or practice becomes standard practice in the target market.

Interaction with Federal Policies

Several kinds of federal policies and programs can interact with incentive and financing programs. These programs offer technical assistance, technical specifications for eligible products or projects, federal funding, and opportunities to coordinate delivery of state efforts with regional and national programs. Examples of federal initiatives with which state programs can form partnerships or otherwise interact include:

- *ENERGY STAR.* States have used ENERGY STAR equipment and product specifications as the basis for qualification for incentives or financing. Since the late 1990s, EPA and DOE have worked with utilities, state energy offices, and regional nonprofit organizations to help them leverage ENERGY STAR messaging, tools, and strategies and to enhance their local energy efficiency programs. By working with EPA and DOE and using ENERGY STAR as their local platform, these organizations initiate their programs more quickly; increase their program uptake and impact; help drive local market share for ENERGY STAR-qualified products, homes, buildings, and related best practices; contribute to long-term change in the market for these products and services; and deliver on local objectives to increase energy efficiency, maintain electric reliability, and improve environmental quality. For example, states such as Texas, New Jersey, and Vermont have used the ENERGY STAR Homes program as the basis for financial incentives to home builders. In the Northeast, several states have used the ENERGY STAR criteria for clothes washers as the basis for a regionally coordinated network of incentive programs (for more information, see http://www.energystar.gov/).
- *Green Power Partnership.* The Green Power Partnership is a voluntary program developed by EPA to boost the market for clean power sources. Although the program does not provide funding for green power purchases, state and local governments that participate in the partnership receive technical assistance and can use the program's

Best Practices: Designing Clean Energy Funding and Incentive Programs

The best practices identified below address common design elements for developing clean energy funding and incentives programs, based on experiences of states that have implemented successful programs.

- Conduct robust technical and economic analyses to screen technologies and program designs and to ensure that the program is designed to achieve significant impacts and is cost-effective.
- Conduct market research to understand customer preferences, market structures, and other factors that will affect program success, as appropriate.
- Set technical requirements for eligible equipment and practitioners to encourage significant energy savings and system performance (for renewables and CHP) and to ensure that measures and projects receive appropriate quality control.
- Consider how financial incentives can complement or leverage other state programs and policies and federal financial incentives.
- Provide ongoing public education about clean energy technologies and available incentives.
- Provide stable, long-term program funding where appropriate and plan for decreasing funding as markets change.
- Keep program design and procedures as simple as possible, and make it easy to participate.
- Cooperate with utilities, industry allies, and market participants to reach key market "gateways."
- Establish a consistent but cost-effective quality assurance mechanism.
- Incorporate incentives into an overall market development strategy; include installer training and certification.
- Develop a coordinated package of incentives and other services, including:
  - For energy efficiency: customer promotions, industry ally partnerships for marketing, training, and education.
  - For renewable energy: interconnection standards and net metering.
- Provide for hard-to-reach market segments, including public facilities, low-income households, small businesses, and nonprofit organizations.
- Design the program to be valuable, by creating program tracking and reporting systems that allow review of completed projects.
- Allow flexibility for program modifications.

Green Power Purchasing Guide to inform their green power purchasing decisions. (For more information, see http://www.epa.gov/greenpower/index.htm.)

- *The Energy Policy Act of 2005 (EPAct 2005)* provides tax credits for energy-efficient appliances and vehicles, and extends the PTC for renewable energy generation to 2007. EPAct 2005 also authorizes funding to support state energy efficiency programs, although many of the provisions will require congressional appropriations.

  The Energy Efficient Appliance Rebate Program authorizes matching appliance rebates to be operated by state energy offices. Through this program, states have an alternative source of funds and a state rebate program to purchase ENERGY STAR appliances to replace existing appliances.

  Under the Federal Production Tax Credit, defined renewable power technologies, such as wind, geothermal, and other grid-scale technologies, are eligible for federal credits for each kWh generated. State incentives have been designed to coordinate with the PTC to help spur renewable energy development in the state (LBNL 2002). For example, MTC invests in renewable energy in the state (for more information, see: http://www.mtpc.org).

Interaction with State Policies

States have combined their financial incentives with other state clean energy programs and policies to deliver even greater energy and cost savings. Funding and incentives programs interact with many state policies, including:

- *PBF Programs.* PBFs can be used as a source of direct incentives, such as rebates, and also as a source of financing assistance. PBFs are funds typically created by levying a small fee on customers' utility bills. PBFs in 17 states and Washington, D.C. support energy efficiency programs, and PBFs in 16 states are used to promote renewable energy. (See Section 4.2, *Public Benefits Funds for Energy Efficiency,* and Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs*.)
- *Portfolio Management.* Portfolio management refers to an electric utility's energy resource planning and procurement strategies. Effective portfolios are diversified and include a variety of fuel sources and generation and delivery technologies and financial incentives to encourage customers to reduce their consumption during peak demand periods. Portfolio management delivers clean air benefits by shifting the focus of procurement from short-term, market-driven, fossil fuel-based prices to long-term, customer costs and customer bills by ensuring the consideration of energy efficiency and renewable generation resources. (See Section 6.1, *Portfolio Management Strategies*.)
- *Environmental Enforcement Cases.* Under a settlement, a violator may voluntarily agree to undertake an SEP (an environmentally beneficial project) as a way to offset a portion of its monetary penalty (see *Supplemental Environmental Projects,* on page 3-83).
- *Lead by Example Programs.* Many states lead by example through the implementation of programs that achieve energy cost savings within their own facilities, fleets, and operations. Lead by example programs include innovative financing mechanisms, such as revolving loan funds, tax-exempt master lease-purchase agreements, lease revenue bonds, performance contracting, and procurement policies and accounting methods (for more information, see Section 3.1, *Lead by Example*).
- *RPS.* In states with RPS requirements, financial incentives can be used strategically to support the development of more renewable energy generation in the state. Some states have decided to use financial incentives to support only renewable energy generation that occurs in addition to the state's RPS requirements. States can also add efficiency to the RPS, as in Pennsylvania, or create a separate efficiency performance standard, as in Connecticut. (See Section 5.1, *Renewable Portfolio Standards*.)
- *Interconnection, Net Metering, and Standby Rates.* Some states have modified their interconnection standards, net metering rules, and/or standby rate structure to facilitate easier interconnection for renewable energy systems, increase their profitability, and provide incentives for clean energy. In states where interconnection issues have not been addressed, renewable energy generators may face hurdles with connecting to the grid and may not have the financial incentives required to ensure the system is sufficiently profitable. Net metering rules enable renewable energy system owners to sell excess production to the utility at retail rates rather than wholesale rates, effectively providing a per-kWh incentive (see Section 5.4, *Interconnection Standards*). Some states are also reviewing utility standby rates to ensure that they are reasonable and appropriate and do not unnecessarily limit the development of clean and efficient onsite generation. (See Section 6.3, *Emerging Approaches: Removing Unintended Utility Rate Barriers to Distributed Generation*.)
- *Encouraging Green Power.* Some states stimulate the green power market by establishing mandates for state government facilities to satisfy a percentage of their electricity demands with green power (e.g., RECs or green power electricity products). (See Section 3.1, *Lead by Example*, and Section 5.5, *Fostering Green Power Markets*.)

Implementation and Evaluation

Implementing and Administering Funding and Incentives Programs

The most appropriate agency to implement and administer funding and incentive programs varies, depending on the state and type of incentive program offered. In most states, the state energy office manages the program. Other agencies involved in program implementation include the state department of general services, treasury department, and others. In some states (e.g., Oregon and Iowa), a private nonprofit organization implements and evaluates funding and incentives programs.

Objectives for the agency administering the incentives program include (Brown et al. 2002):

- Create sufficient budget authorizations and appropriations to ensure the effectiveness of the program, measured against actionable performance criteria where possible.
- Allow for an adequate time period (typically five to 10 years) for the funding to influence the market.
- Determine an appropriate incentive level for targeted technologies and markets (e.g., incentives should be large enough to generate the investment needed to meet program goals and moderate enough to stay within the budget).
- Establish funding caps per project and per customer to keep programs affordable and sustainable.
- Focus on high-efficiency technologies and practices by setting technical criteria that target the high end of the target market.
- Be flexible with respect to who receives the incentives so that the most appropriate parties can participate.
- Incorporate sufficient reporting requirements to document program results accurately and prevent program abuse.
- Budget adequately for evaluation and conduct evaluations on regular cycles. Allow for selected detailed audits of larger and more complex projects.

The implementing/administering agency is also responsible for ensuring that an adequate program support structure is in place. This might entail the following actions:

- Allocate sufficient personnel and time for program administration.
- Collaborate with other agencies.
- Establish agreements with equipment installers, manufacturers, and service providers.
- Collaborate with utilities.
- Conduct public outreach and education campaigns.
- Conduct periodic program evaluations and take corrective measures, if necessary.

Best Practices: Implementing Funding and Incentive Programs

- Consult with other states to gain the benefit of their experiences with program implementation details.
- Select the most appropriate delivery organization(s) for program delivery.
- Approve long-term funding cycles (five to 10 years) to enable programs to achieve significant market acceptance and impacts.
- Maintain stakeholder communications via working relationships and advisory groups.
- Provide for adequate program tracking and reporting systems to enable effective evaluation and mid-course program corrections.

Evaluation

In general, states evaluate their state financial incentives programs based on quantitative metrics, such as the amount of money granted, energy savings, and the number of systems installed. In addition, the administrative process is frequently evaluated to track data such as the number of days it takes the state to process an application. While more challenging, states also attempt to determine if financial incentives have the desired effect on the marketplace (i.e., understanding the causal relationship between the incentives and the changes occurring in the market, accounting for "free riders" and estimating the net

energy savings impacts achieved by incentives). Standardized reporting requirements and independent measurement and verification (M&V) of program impacts provide the information required to redirect future investment dollars for optimal effectiveness.

States have found that M&V methods are critical to ensuring that sufficient projected savings are realized to determine if funding and incentive investments provide their expected return. For simpler measures with well-established savings performance records, a "deemed savings" approach can be used. For more complex measures, newer technologies, and larger projects, a project-specific M&V approach is warranted. (For more information on M&V methods, see Section 4.1, *Energy Efficiency Portfolio Standards,* and Section 4.2, *Public Benefits Funds for Energy Efficiency.*) Several states have established detailed procedures and technical support documents describing "deemed savings" methods, including:

- The California Measurement Advisory Council (CALMAC) (CALMAC 2005).
- *Efficiency Vermont Technical Reference Users Manual*, published by Efficiency Vermont (2004).

For project-specific M&V methods, the following resources are helpful:

- *The International Program Measurement and Verification Protocol* (IPMVP) (IPMVP 2005).
- The Texas PUC's *Measurement and Verification Guidelines* (Texas PUC 2005).
- DOE Federal Energy Management Program (FEMP) guidelines, Measurement & Verification Resources and Training Opportunities (Webster 2003).

Several states have conducted evaluations of their funding and incentives programs. For example, the California Public Utilities Commission (CPUC) evaluates the Self-Generation Incentive Program (SGIP) each year to assess process, impact, and cost-effectiveness (CPUC 2005b). Part of the state's 2004 evaluation included interviews with 47 SGIP cogeneration system owners regarding their system implementation and operations experiences during the year. The evaluation found that, while the SGIP is very well subscribed, and program participants are on average satisfied with their SGIP systems, many cogeneration systems do not appear to be performing as well, or operating for as many hours, as originally expected (CPUC 2005b).

NYSERDA evaluated its DG/CHP program to understand how the internal processes of the program have progressed, assess the progress of and barriers to technology transfer, and determine end users' and consultants' levels of satisfaction with the program. The evaluation involved a review of current savings procedures and data tracking, interviews with DG/CHP program managers, and a review of data summaries for projects. The evaluation results revealed that staff and participants are enthusiastic about the program and that many nonparticipants also have positive feelings about it. Several recommendations for improvements were received, including making the proposal and selection process

Best Practices: Evaluating Funding and Incentive Programs

Evaluating funding and incentives programs requires tracking program use, cost, and energy savings, as well as providing easy public access to program information.

- Evaluate programs regularly, rigorously, and cost-effectively.
- Use methods proven over time in other states, adapted to state-specific needs.
- Provide "hard numbers" on quantitative impacts and process feedback on the effectiveness of program operations and ways to improve service delivery.
- Use independent third parties, preferably with reputations for quality and unbiased analysis.
- Measure program success against stated objectives, providing information that is detailed enough to be useful and simple enough to be understandable to nonexperts.
- Provide for consistent and transparent evaluations across all programs and administrative entities.
- Communicate results to decisionmakers and stakeholders in ways that demonstrate the benefits of the overall program and individual market initiatives.

less confusing, initiating better communication with utilities about interconnection and standby rate charges, and developing an incentive program with stable funding to allow for replication of projects (NYSERDA 2004).

State Examples

The following examples illustrate effective state programs, innovative approaches, and program results for each of the key types of financing and incentive programs.

Revolving Loan Funds

Texas LoanSTAR

Texas LoanSTAR, also known as the Loans to Save Taxes and Resources program, began in 1988 as a $98.6 million retrofit program for energy efficiency in buildings (primarily public buildings such as state agencies, local governments, and school districts). The program is now funded at a minimum of $95 million annually. The original funding for the program was from PVE funds. The Texas State Energy Conservation Office (SECO) administers the funds through DOE's State Energy Program.

SECO provides extensive program oversight and documentation, ensuring that the data used to establish claims for energy savings are accurate. SECO develops procedures and guidelines that allow LoanSTAR to prove that the financed energy retrofits would pay for themselves. As part of its quality control, SECO:

- Issues energy assessment guidelines.
- Trains energy engineering consulting firms on audit techniques and LoanSTAR guidelines.
- Develops protocols to meter and monitor each LoanSTAR project to track pre- and post-retrofit energy consumption.
- Develops new methods to analyze energy savings from retrofits.

Public agencies in Texas have realized substantial savings on their energy bills through LoanSTAR that continue to accrue year after year. As measured from the beginning of the program through December 2004, total savings amount to almost $152 million, on an investment of $123 million. This amount reflects measured savings from 1989, when the first loan was funded, through 2000, and stipulated savings from 2001 through December 2004. Total savings are calculated directly from metered and monitored energy consumption data collected before and after the energy retrofits. Stipulated savings are used for buildings where the energy-saving measures contribute year after year at an established level but where monitoring equipment is no longer in place (DOE 2005).

Web site:
http://www.seco.cpa.state.tx.us/ls.htm

Iowa Energy Bank

Iowa's Energy Bank program provides technical and financial assistance to public and nonprofit facilities for installing cost-effective EE/RE improvements. This energy management program uses energy cost savings to repay financing for energy management improvements. It targets public schools, hospitals, private colleges, private schools, and local governments. The Iowa Energy Bank helped finance $150 million in energy efficiency improvements in state and local facilities from 1989 through 2001.

The Iowa Energy Bank program starts with an initial energy audit. This assessment may be an extensive energy audit, or for small facilities, a simpler assessment of energy consumption and potential improvements by Energy Bank program staff. If necessary, an engineering analysis is completed for the facility by a qualified consultant. A six-month, interest-free loan is available to pay the up-front expense of the energy audit and engineering analysis. Full-term, municipal lease-purchase agreements or capital loan notes from private lending institutions are available at interest rates negotiated for the client by the Iowa Department of Natural Resources (DNR). All clients of the program are eligible for financing of cost-effective energy management improvements.

Web site:
http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/BEM/EBANK/index.html

Montana Alternative Energy Loan Fund

Montana's revolving loan fund, established in May 2001, initially provided up to $10,000 (at a 5% interest rate in 2004) to individuals and small businesses for small renewable energy systems up to 1 MW in size. In March 2005, the Montana Legislature passed a bill that amended the loan program, raising the maximum loan amount to $40,000 and extending the repayment period from five years to 15 years. As of 2004, the Alternative Energy Loan Fund has more than $425,000 available for disbursement to loan applicants. Financial interest accruing to the fund, as well as interest generated from loan repayments, is re-deposited into the fund to sustain the program.

The fund is managed by the Montana Department of Environmental Quality (DEQ) and is supported by penalties from air quality violations in Montana. Eligible resources include wind, solar, geothermal, fuel cells, biomass, hydroelectric, and solid waste methane. Montana also provides a 35% investment tax credit for businesses that manufacture alternative energy generating equipment, use energy from alternative energy generating equipment, or install net metering equipment for connecting alternative energy generation systems to the electrical grid (Montana DEQ 2005). The 2005 law also added local government agencies, universities, and nonprofit organizations to the list of eligible sectors.

Web site:
http://www.deq.state.mt.us/energy/Renewable/altenergyloan.asp

Energy Performance Contracting

Washington

In 2001, the Washington legislature adopted legislation requiring all state facilities to conduct energy audits to identify energy savings opportunities and to use performance contracting as their first option for achieving those savings (Washington HB 2247 2001). This law has led to a surge in performance contracting activity: $100 million has been invested in project implementation by the private sector, with net savings of over $8.3 million annually.

The Washington Department of General Administration (DGA) energy team has designed an energy performance contracting (EPC) program specifically for state agencies, colleges and universities, cities and towns, counties, school districts, ports, libraries, hospitals, and health districts. The EPC program provides assistance to public facilities in completing energy performance contracting projects and includes free preliminary audits and consulting services. The program complies with competitive statutory requirements to save time and money. The DGA helps state agencies qualify for the low-interest state treasury financing that is available for EPC projects.

Tax Incentives

Oregon

The Oregon DOE offers BETCs and RETCs to Oregon businesses and residents that invest in qualifying energy-efficient appliances and equipment, recycling, renewable energy resources, sustainable buildings, and transportation (e.g., alternative fuels and hybrid vehicles). The BETC is for 35% of the eligible project costs and applies to the incremental cost of the system or equipment that is beyond standard practice. The RETC varies depending on the type of equipment purchased and amount of energy savings. Through 2004, more than 12,000 Oregon energy tax credits worth $243 million have been awarded. Altogether, those investments save or generate energy worth about $215 million a year (Oregon DOE 2005a). Business owners who pay taxes for a business site in Oregon are eligible for the tax credit. Oregon nonprofit organizations, tribes, or public entities that partner with an Oregon business are also eligible, as are residents who have an Oregon tax liability.

The BETC offers an innovative pass-through option, which allows a project owner to transfer the 35% BETC project eligibility to a pass-through partner for a lump-sum cash payment. The pass-through option rate for five-year BETCs (effective October 1, 2003) is 25.5%. The pass-through option rate for one-year BETCs (those with eligible costs of $20,000 or less) is

30.5%. The Oregon Department of Energy sets these pass-through option rates (Oregon DOE 2005a).

Web site:
http://egov.oregon.gov/Energy/CONS/BUS/BETC.shtml

New York

New York operates three individual tax credit programs in addition to its suite of PBF-funded programs. The state began its Green Building Tax Credit Program in 2002. The income tax incentive is intended to spur growth of the green buildings market, including energy efficiency measures and incorporation of solar energy. This was the first state program of its kind and has been adapted by several other states. NYSERDA and the New York State Department of Environmental Conservation (DEC) administer the program. $25 million is available annually for the tax credit for buildings greater than 20,000 square feet (Brown et al. 2002). The PV credit is for 100% of the incremental cost of "building-integrated" PV modules (20% every year over a five-year period) with a cap of $3 per watt.

In addition, New York provides a personal income tax credit for solar PV systems. The credit is for 25% of equipment and installation costs, with qualified expenditures capped at $6 per watt. Any portion of the system cost that is funded by a grant (from any source) cannot be counted toward the tax credit.

New York also provides a 15-year property tax exemption for solar, wind, and biomass systems installed before January 1, 2006.

Web site:
http://www.dec.state.ny.us/website/ppu/grnbldg/

Grants, Buy-Downs, and Generation Incentives

Grants, buy-downs, and generation incentives provide funding and incentives to invest in energy efficiency and clean generation technologies. Typically, energy efficiency measures can be promoted through buy-downs (also known as rebates), while clean generation is supported through buy-downs and generation incentives.

California

California operates a rebate program and a generation incentive program that, together with its PBF-funded Emerging Renewables Program, cover a broad range of renewable energy technologies from small customer-sited PV systems to large commercially owned wind and biomass facilities. (For more information on California's generation incentives program, the Supplemental Energy Payments program, and Emerging Renewables Program supply, see Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs*.)

The SGIP provides rebates for systems over 30 kW and up to 5 MW in size, including microturbines, small gas turbines, wind turbines, PV, and fuel cells. The program was authorized in 2001 by the CPUC and extended in 2003 by the state legislature. It provides $125 million per year for program administration and customer incentives. Funds are collected through an electricity distribution charge that is separate from the public goods charge and administered by the state's four investor-owned utilities. The rebate amounts vary depending on the technology. The rebate for solar PV, for example, is $3.50 per watt. As with the Emerging Renewables Program (see Section 5.2, *Public Benefits Funds for State Clean Energy Supply Programs*), the SGIP is available for service customers in investor-owned utility territories. The SGIP offers incentives to encourage customers to produce electricity with microturbines, small gas turbines, wind turbines, PV, fuel cells, and internal combustion engines. The incentive payments range from $1 per watt to $4.50 per watt, depending on the type of system. CHP systems are eligible for the lowest incentive payment. CHP systems must be

between 30 kW and 5 MW to qualify. The SGIP has been instrumental in the increasing the number of small PV (between 30 kW and 1 MW) and CHP systems (5 MW or smaller) in the state. As of 2004, the program has supported 388 systems (235 PV, 1 wind turbine, 2 fuel cells, and 150 CHP systems) with a total online capacity of 103 MW, including 82 MW of PV capacity (CPUC 2005b). As shown in Figure 3.4.3, the total grid-connected PV capacity installed in California in 2005 was more than 130 MW (CEC 2005c).

Web sites:
http://www.ora.ca.gov/distgen/selfgen/sgips/index.htm

http://www.cpuc.ca.gov/static/energy/electric/050415_sceitron+sgip2004+impacts+final+report.pdf

New York

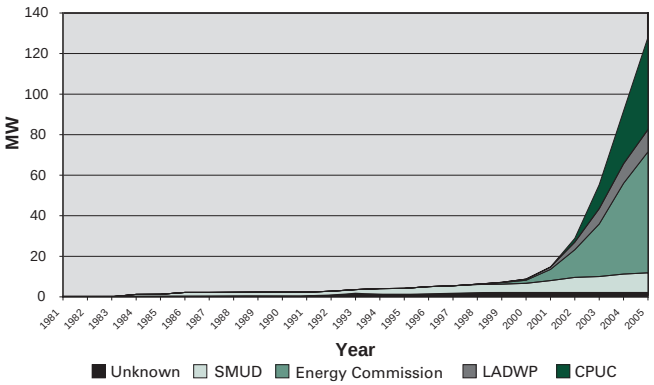
NYSERDA implements a grant program to assist companies in developing, testing, and commercializing renewable energy technologies manufactured in New York. The program focuses on product and technology development rather than on installation of individual renewable energy systems. Projects are selected based on whether they will be commercially competitive in the near term and the ability of the company to achieve specific performance and quality milestones. Eligible technologies include solar thermal, PV, hydro, alternative fuels, wind, and biomass.

Web site:
http://www.nyserda.org/

Washington

Senate Bill 5101 (S.B.5101), signed in May 2005, established a base production incentive of $0.15/kWh (capped at $2,000 per year and roughly tailored to the yearly market output of a typical 3.5 kW PV system) for individuals, businesses, or local governments generating electricity from solar power, wind power or anaerobic digesters—the first use of this approach in a U.S. state. The incentive amount

Figure 3.4.3: Grid-Connected PV Capacity Installed in California *(cumulative)*



Source: CEC 2005c.

paid to the producer is adjusted based on how the electricity was generated by multiplying the incentive ($0.15/kWh) by the economic multipliers shown in Table 3.4.1.

The economic multipliers favor equipment manufactured in Washington, with the goal of developing a renewable manufacturing industry in the state. The incentives apply to power generated as of July 1, 2005 and remain in effect through June 30, 2014.

The Washington Department of Revenue (DOR) is responsible for submitting a report measuring the impacts of this legislation, including any change in the number of solar energy system manufacturing companies in Washington and the effects on job creation (e.g., the number of jobs created for Washington residents).

Publicly and privately owned utilities in Washington will pay the incentives and earn a tax credit equal to the cost of those payments. The credit may not exceed $25,000 or 0.025% of a utility's taxable power sales, whichever is larger. Increased sales tax revenues from an expanded renewable energy industry are expected to offset reductions in revenues from utility taxes (Broehl 2005, Washington 2005).

Table 3.4.1: Economic Multipliers Used for Washington's Production Incentive Program

Solar modules manufactured in Washington	2.4
Solar and wind generation equipped with inverters manufactured in Washington	1.2
Anaerobic digester and other solar equipment or wind generator equipment with blades manufactured in Washington	1.0
All other electricity generated by wind	0.8

Source: Washington 2005.

NO_x Set-Asides

New York

The New York State DEC administers the NO_x Budget Trading Program and allocates the state's NO_x emission allowances, which are partially set aside for energy-efficient projects. In 2003, the size of the set-aside was 3% of the state's NO_x trading program (1,241 tons). Sites that meet the emissions allowances criteria may apply for the allowances and then sell them to other NO_x-emitting sources for cash. Eligible sites include end-use energy efficiency projects, renewable energy projects, in-plant energy efficiency projects, and fossil fuel-fired electricity generating units that produce electricity more efficiently than the annual average heat rate attributable to all fossil fuel-fired electricity generated within New York State.

Web site:
http://www.dec.state.ny.us/

Supplemental Environmental Projects

Colorado

The state of Colorado adopted an SEP policy as part of its environmental enforcement and compliance assurance strategy. Colorado's Department of Public Health and Environment (CDPHE) uses decision criteria on a case-by-case basis to determine whether an SEP is appropriate. During routine inspections in 2000, a large Denver-based industrial gas compression company was found in violation of chlorofluorocarbon (CFC) emission regulations. The company was assessed a noncompliance fee of $30,000 and a civil penalty of $395,000. Through a settlement agreement with CDPHE, the company agreed to implement an SEP to reduce air pollution.

Under the settlement agreement, the company agreed to pay a mitigated civil penalty—80% of the total, or $303,360—into an interest-bearing escrow account managed by Public Service of Colorado. The SEP will now fund five years of wind energy purchases, or approximately 2,426,880 kWh of electricity. The agreement also stipulates that the energy comes from new wind generation facilities. Public Service of Colorado must use funds remaining in the escrow account after the fifth year (2005) to continue purchasing wind power. Interest that accrues on the escrow account is similarly invested.

Environmental and health benefits include avoided emissions of:

- 3,640 metric tons of CO_2
- 73 metric tons of SO_2
- 97 metric tons of NO_x

These emission reductions are equivalent to avoiding 58.2 million vehicle miles per year (NREL 2003).

The SEP wind purchase also instituted a process for streamlining future renewable energy purchases at the Public Service of Colorado. This will provide substantial administrative savings to both providers and customers.

Web site:
http://www.cdphe.state.co.us/el/cross_media/seps.html

What States Can Do

States have diversified what were originally simple grant or loan programs into a broader set of funding and incentive programs that encourage specific markets and customer groups to invest in energy efficiency and clean supply projects. The information in this *Guide* describes best practices for design, implementation, and evaluation; summarizes a wide range of state experiences with funding and incentive programs; and offers a variety of information resources on funding and incentive strategies. Based on these state examples, action steps for states that want to establish their own funding and incentives programs or strengthen and expand existing programs are described below.

Action Steps for States

States interested in creating or expanding clean energy funding and incentive programs can take the following steps:

- *Develop an Inventory of Current Financing and Incentive Programs.* Review existing programs and identify the need for new or expanded offerings. Conduct market research, as necessary, to identify these needs.
- *Design Funding and Incentive Programs Based on the Best Practices Developed by Other States.* States' experiences with funding and incentive programs provide a rich source of information on how to develop successful programs.
- *Identify and Secure Funding Sources.* This can be done via legislative and administrative initiatives, as appropriate. Seek to coordinate program targets and information collection efforts to avoid overlap and duplication.
- *Conduct Rigorous Evaluation.* Upon completion, report the results to policymakers, industry, and the public.

Information Resources

Information About States

Title/Description	URL Address
The Database of State Incentives for Renewable Energy (DSIRE). This database contains information on federal, state, and local incentives that promote renewable energy and energy efficiency. It provides information for all 50 states and is updated regularly.	http://www.dsireusa.org
Innovation, Renewable Energy, and State Investment: Case Studies of Leading Clean Energy Funds. This Lawrence Berkeley National Laboratory (LBNL) Web site contains case studies of various state clean energy funds.	http://eetd.lbl.gov/ea/EMS/reports/51493.pdf
The National Renewable Energy Laboratory (NREL), Case Studies on the Effectiveness of State Financial Incentives for Renewable Energy. This NREL report presents state case studies on financial incentives for renewable energy. NREL/SR-620-32819. Gouchoe, S., V. Everette, and R. Haynes. 2002. NREL, DOE. September (vi).	http://www.nrel.gov/documents/profiles.html
Performance Contracting Legislation By State. This Oak Ridge National Laboratory Web site contains information on performance contracting legislation by state. The site includes links to legislation and state performance contracting legislation.	http://www.ornl.gov/info/esco/legislation/
State Environmental Resource Center Energy Efficiency Standards. This Web site offers the tools to bring energy efficiency standards to individual states. These tools include a model bill, talking points, press clips, a fact pack, links, and other background information.	http://www.serconline.org/efficiencystandards/pkg_frameset.html
Union of Concerned Scientists. This report assigns grades to each of the 50 states based on their commitment to supporting wind, solar, and other renewable energy sources. 2003. Plugging In Renewable Energy: Grading the States. May. Accessed September 14, 2005.	http://www.ucsusa.org/clean_energy/clean_energy_policies/plugging-in-renewable-energy-grading-the-states.html

General Information

Title/Description	URL Address
Designing Financial Incentives	
CESA Year One: A Report on Clean Energy Funds in the U.S. 2003–2004. Clean Energy States Alliance. August 2004.	http://www.cleanenergystates.org/library/Reports/CESA Year One Report Final.pdf
Energy Efficiency's Next Generation: Innovation at the State Level. This American Council for an Energy-Efficient Economy (ACEEE) report describes state energy efficiency activities. ACEEE, 2003. W. Prindle, N. Dietsch, R. Neal Elliot, M. Kushler, T. Langer, and S. Nadel. Report No. E031. ACEEE.	http://aceee.org/pubs/e031full.pdf
State Initiatives for Clean Energy Development. Final Project Report. October 2001. Prepared for Mainewatch Institute, Hallowell, ME by Ed Holt and Associates. The Maine Center for Economic Policy.	http://www.mecep.org/cleanenergy/initiatives_for_clean_ener.html
Revolving Loan Funds	
Iowa Energy Bank. This Iowa DNR Web site contains information about the Iowa Energy Bank.	http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/BEM/EBANK/index.html
Texas Revolving LoanSTAR. The Texas SECO administers the LoanSTAR program. Additional information about the program is available at SECO's Web site.	http://www.seco.cpa.state.tx.us/ls.htm
Texas Revolving LoanSTAR Conservation Update Feature Story. This DOE, EE/RE Web page presents a case study describing the Texas revolving loan fund program. January–February 2005.	http://www.eere.energy.gov/state_energy_program/feature_detail_info.cfm/start=1/fid=45
Energy Performance Contracting	
Energy Performance Contracting. The Energy Services Coalition is a nonprofit organization that promotes energy service performance contracting.	http://www.energyservicescoalition.org/
The National Association of Energy Service Companies (NAESCO). NAESCO is a trade association in the energy services industry, representing ESCOs, distribution companies, distributed generation companies, engineers, consultants, and finance companies. The Web site contains information on energy efficiency for buildings.	http://www.naesco.org
Performance Contracting Activities by State. This section of the Energy Services Coalition Web site provides information and resources about performance contracting programs by state.	http://www.energyservicescoalition.org/resources/states/activities.htm
Performance Contracting Legislation by State. This Oak Ridge National Laboratory Web site contains information on performance contracting legislation by state. The site includes links to legislation and state performance contracting legislation.	http://www.ornl.gov/info/esco/legislation/
Tax Incentives	
The Database of State Incentives for Renewable Energy. This Web site provides information on state, local, utility, and selected federal incentives that promote renewable energy and energy efficiency.	http://www.dsireusa.org/
State Environmental Resource Center Issue: Energy Efficiency Tax Incentives. This site includes a variety of examples of tax incentives and legislation that have been introduced by different states to decrease energy use.	http://www.serconline.org/energytaxincentives.html

Title/Description	URL Address
Tax Incentives *(continued)*	
State Taxation in a Changing U.S. Electric Power System: Policy Issues and Options. This paper includes an overview of state tax incentives related to electricity generation and describes options for designing incentives to support energy efficiency and renewable energy. M.H. Brown and C. Rewey. National Conference of State Legislatures, December 2004.	http://www.ncsl.org
Tax Credits for Energy Efficiency and Green Buildings: Opportunities for State Action. This ACEEE report analyzes state tax energy efficiency tax incentives provided by the states for the private sector. ACEEE, 2002. E. Brown, P. Quinlan, H.M. Sachs, and D. Williams. Report #E021, March. ACEEE.	http://aceee.org/pubs/e021full.pdf
Designing Financial Incentives	
Incentives, Mandates, and Government Programs Promoting Renewable Energy. This paper discusses major financial incentives used by federal and state governments and their effectiveness in promoting renewable energy.	http://www.eia.doe.gov/cneaf/solar.renewables/rea_issues/incent.html
U.S. Combined Heat and Power Association (USCHPA). This Web site provides information on federal policies, including tax incentives, designed to promote more widespread use of CHP systems.	http://uschpa.admgt.com/PolicyFed.htm
Grants, Buy Downs, and Generation Incentives	
ACEEE. ACEEE Energy Efficiency Program Database.	http://aceee.org/new/eedb.htm
California Energy Commission (CEC), Emerging Renewables Program. This site provides information about the Emerging Renewables Program (formerly called the "Emerging Renewables Buy-Down Program"), which was created to stimulate market demand for renewable energy systems by offering rebates to reduce the initial cost of the system to the customer.	http://www.energy.ca.gov/renewables/emerging_renewables.html
Connecticut Light and Power (CL&P). The CL&P Energy Efficiency at Work Web site describes the utility's Express Rebate Program. The programs offer CL&P business customers an opportunity to improve the energy efficiency of their stores or buildings.	http://www.cl-p.com/clmbus/express/indexexpress.asp#lighting
CPUC. The CPUC Web site provides information on CPUC activities and regulations.	http://www.cpuc.ca.gov/
CPUC Self-Generation Incentive Program. This site provides information about this California program to provide rebates to encourage distributed generation technologies.	http://www.ora.ca.gov/distgen/selfgen/sgips/index.htm
The New York State DEC. This Web site describes energy efficiency projects it administers, including details on the Green Building Initiative tax credits.	http://www.dec.state.ny.us/
Northwest Solar Center Web site. This site provides information on the use of solar energy in the Northwest. It contains information on Washington's production incentive program.	http://northwestsolarcenter.org/
NYSERDA. This Web site provides information on NYSERDA's projects, including those promoting energy efficiency.	http://www.nyserda.org/
Renewable Resources Development Report. This report by the CEC provides details on actions the state is taking to promote development of renewable energy generation, with particular focus on RPS.	http://www.energy.ca.gov/reports/2003-11-24_500-03-080F.pdf

Title/Description	URL Address
NO_x Set Asides for Energy Efficiency and Renewable Energy Projects	
Creating an Energy Efficiency and Renewable Energy Set-Aside in the NO_x Budget Trading Program (Draft, April 2000 EPA-430-K-00-004). This EPA guidance document contains additional details on designing the set-aside application process, allocating to eligible projects, translating energy savings into emission reductions, determining a time frame for implementation and awards, and establishing documentation and reporting procedures.	http://www.epa.gov/cleanenergy/stateandlocal/guidance.htm
Designing Measurement and Verification Requirements. This EPA document is under development and will provide additional guidance to states on options for measuring and verifying the potential emission reductions resulting from EE/RE projects.	URL not available.
Guidance on Establishing an Energy Efficiency and Renewable Energy (EE/RE) Set-Aside in the NO_x Budget Trading Program. March 1999. This EPA guidance document discusses the elements that a state may consider when deciding whether to establish an EE/RE set-aside and how it should be designed (e.g., the size of the set-aside, eligibility, and the length of awards).	http://www.epa.gov/cleanenergy/stateandlocal/guidance.htm
Supplemental Environmental Projects	
A Toolkit for States: Using Supplemental Environmental Projects (SEPs) to Promote Energy Efficiency and Renewable Energy. This EPA toolkit is intended to help state and local governments pursue energy efficiency or renewable energy projects through SEPs. It presents the case for pursuing energy efficiency and renewable energy within settlements, provides examples in which SEPs have been used to support such projects, offers additional ideas for projects, and includes a step-by-step regulatory "road map" for pursuing SEPs.	http://www.epa.gov/cleanenergy/pdf/sep_toolkit.pdf
Measurement and Verification (M&V)	
CALMAC Web Site. California's statewide CALMAC evaluation clearinghouse contains resources for deemed savings and project-specific M&V techniques.	http://www.calmac.org/
Efficient Vermont Technical Reference User Manual. TRM 4-19, published by Efficiency Vermont, 255 S. Champlain Street, Burlington, VT 05401-4717 phone (888) 921-5990. Vermont provides a set of deemed-savings methods in this manual.	http://www.efficiencyvermont.org/ or contact Efficiency Vermont at 1-888-921-5990.
International Performance Measurement and Verification Protocol (IPMVP) Web Site. IPMVP Inc. is a nonprofit organization that develops products and services to aid in the M&V of energy and water savings resulting from energy/water efficiency projects—both retrofits and new construction. The site contains the IPMVP, a series of documents for use in developing an M&V strategy, monitoring indoor environmental quality, and quantifying emission reductions.	http://www.ipmvp.org
M&V Resources and Training Opportunities. DOE FEMP, Revision 5, June 16, 2003. This document describes and provides links to numerous resources on the engineering techniques and tools used for verification of energy savings.	http://ateam.lbl.gov/mv/docs/MV_Resource_ListR6

Examples of Legislation

State	Title/Description	URL Address
Revolving Loan Funds		
Iowa	**State Facilities Legislation** is the enabling legislation for state buildings energy management program.	http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/BEM/EBANK/LEG.PDF
Montana	**Senate Bill 506 in 2001** established an Alternative Energy Loan Fund.	http://data.opi.state.mt.us/bills/2001/billhtml/SB0506.htm
	Senate Bill 50 in 2005 amended the Alternative Energy Loan Fund.	http://data.opi.state.mt.us/bills/2005/billhtml/SB0050.htm
Texas	**Texas Administrative Code.** Subchapter Loan Program for Energy Retrofits. This subchapter describes the Texas revolving loan program for energy efficiency retrofits.	http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=5&ti=34&pt=1&ch=19&sch=D&rl=Y
Tax Incentives		
Maryland	**2001 Clean Energy Incentive Act** established tax incentives for energy-efficient equipment.	http://mlis.state.md.us/PDF-documents/2000rs/bills/hb/hb0020e.pdf
	2001 Green Building Tax Credit provides tax credits for buildings meeting aggressive energy efficiency standards. See text of House Bill 8.	http://mlis.state.md.us/2001rs/bills/hb/hb0008e.rtf
New York	**The New York Assembly** passed the Green Building Tax Credit legislation in May 2000.	http://www.dec.state.ny.us/website/ppu/grnbldg/a11006.pdf
Oregon	**1980 legislation** established the BETC. In 2001, green buildings were added to the BETC. See Oregon Revised Statute 469.	http://www.leg.state.or.us/ors/469.html
Performance Contracting		
Colorado	**Enabling legislation for performance contracting.** (See Title 29 Local Government 29-12.5-101, 29-12.5-102, 29-12.5-103, 29-12.5-104, and Title 24 State Government 24-30-2001, 24-30-2002, 24-30-2003.)	http://198.187.128.12/colorado/lpext.dll?f=templates&fn=fs-main.htm&2.0.
Washington	**Engrossed House Bill 2247-Energy Audits, 2001** is that state's enabling legislation for performance contracting.	http://www.leg.wa.gov/pub/billinfo/2001-02/House/2225-2249/2247_pl_09252001.txt
Grants and Rebates (Buy Downs)		
California	**The California Solar Center** tracks some of the legislation passed for financial incentives for solar in California.	http://www.californiasolarcenter.org/legislation.html
	Legislation for the Supplemental Energy Payments Program.	http://www.dsireusa.org/library/docs/incentives/CA22F.pdf (Senate Bill No. 1038) http://www.dsireusa.org/library/docs/incentives/CA22Fa.pdf (Senate Bill No. 078)
Massachusetts	**MTC's Commercial, Industrial, and Institutional Initiative (CI3).**	http://www.masstech.org/renewableenergy/CI3.htm

State	Title/Description	URL Address
	Grants and Rebates (Buy Downs) *(continued)*	
New York	**The New York State Environmental Conservation Law** (§§ 1-0101, 3-0301, 19-0103,19-0105, 19-0305, 19-0311) provides the New York DEC's authority.	http://www.dec.state.ny.us/website/regs
	NYSERDA has information about its funding program.	http://www.powernaturally.com/Funding/funding.asp?i=2
Washington	**Senate Bill 5101 Providing Incentives to Support Renewable Energy.** This bill establishes production incentives and economic multipliers for renewable energy.	http://www.leg.wa.gov/wsladm/billinfo1/dspBillSummary.cfm?billnumber=51018year=2005

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